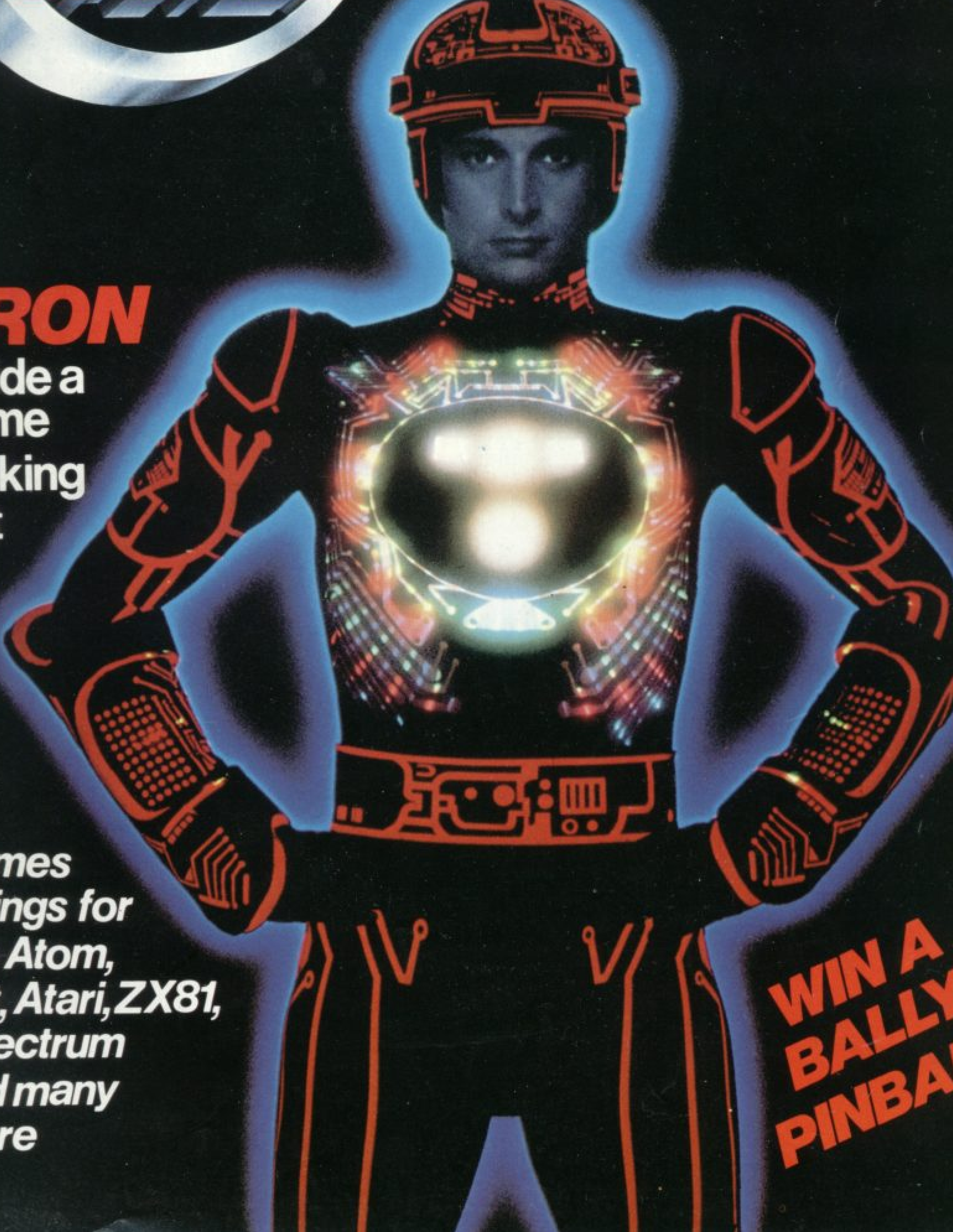
SEPTEMBER 1982
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COMPUTER & VIDEO GAMES

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ISSUE TWO INSIDE



TRON
Inside a game looking out

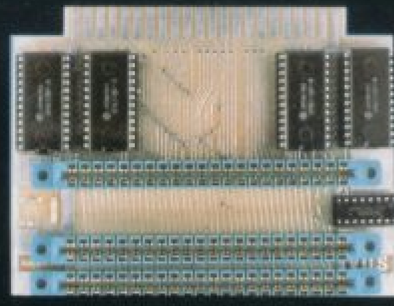
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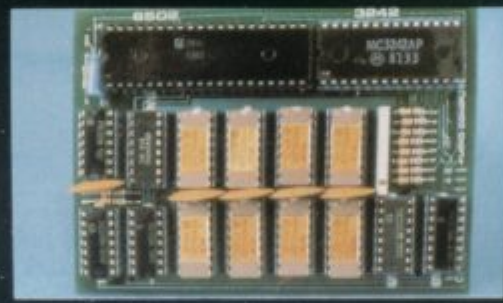
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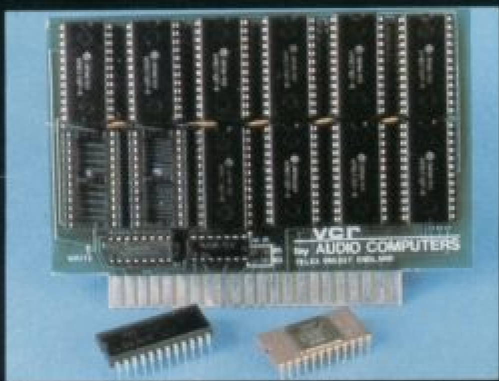


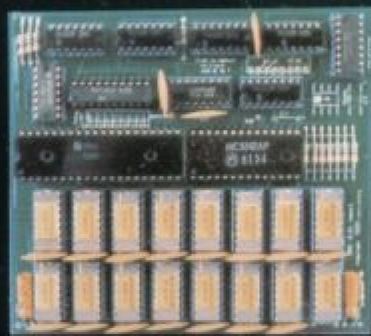
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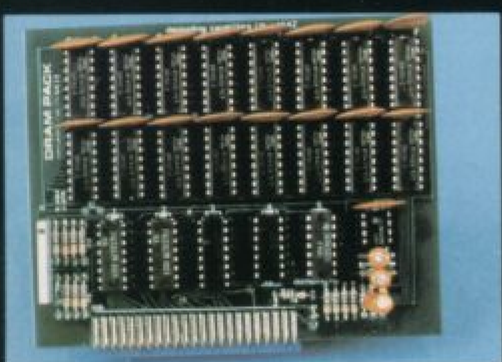


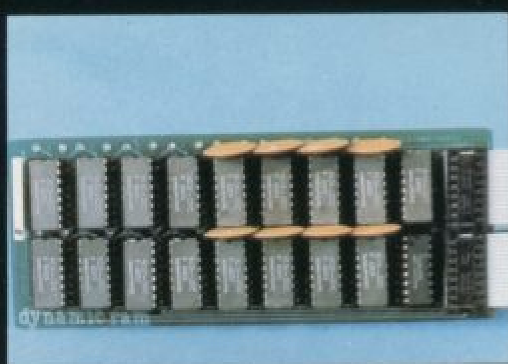


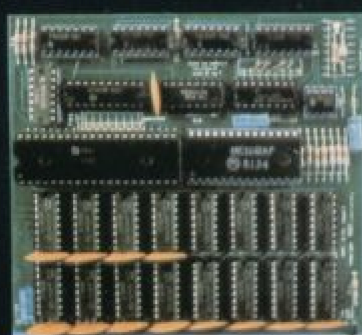
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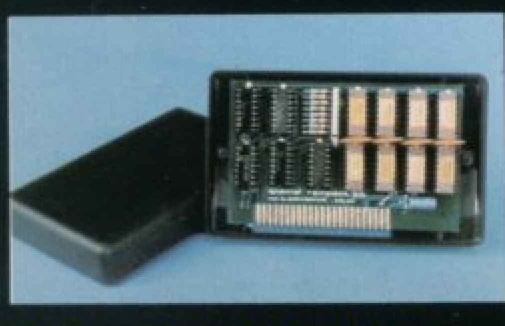
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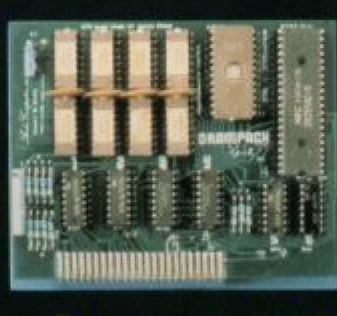
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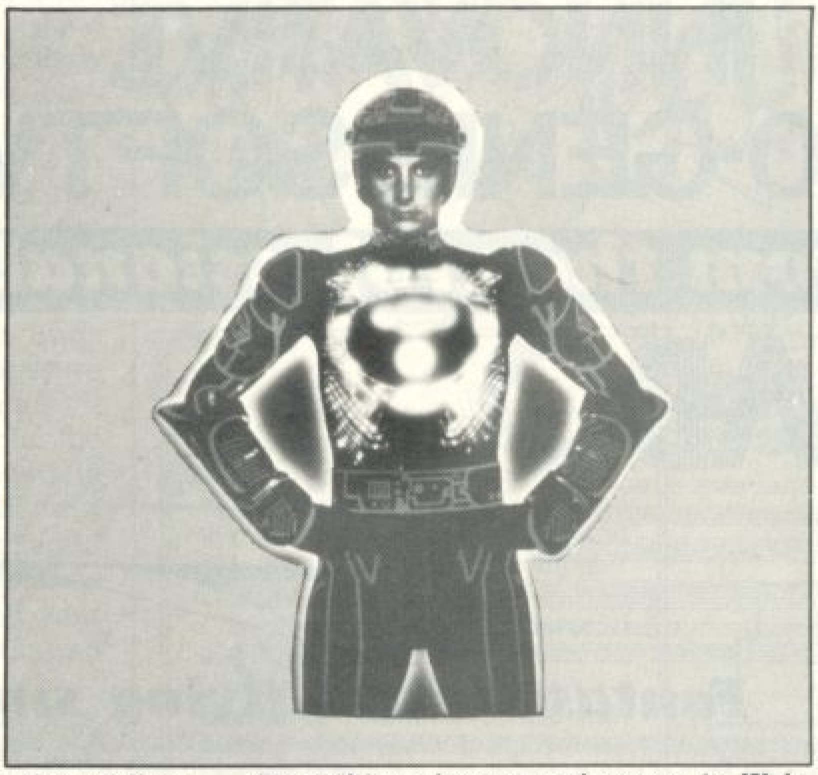
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CONTENTS

SEPTEMBER 1982 No. 11

News & Reviews



This is Tron — the striking character who stars in Walt Disney's latest science fiction blockbuster of the same name. More about him and the film inside. . . .

Light Fantastic . . .

The shape of films to come — that's Tron, the latest eye-dazzling epic from the Walt Disney studios. It's a magical adventure into the world of computers — and includes sequences animated by computer. We asked our American friend Fred D'Ignazio to give us the run down on the movie which will rank with Star Wars and Star Trek as a sci-fi classic. His detailed article on the making of Tron appears on page 70 of this issue. There are some exciting stills from the film to give of taste of what you'll see on the big screen.

There's also an exploration into the unknown as David Langford toys with antimatter on page 28.

Listings







Features

Editor Terry Pratt, **Staff Writer** Eugene Lacy, **Editorial assistant** Susan Cameron, **Design** Linda Freeman, **Production editor** Tim Metcalfe, **Advertisement manager** Rita Lewis, **Advertising executive** Neil Wood **Advertisement assistant** Louise Flockhart, **Publisher** Tom Moloney

Editorial and advertisement offices: Durrant House, 8 Herbal Hill, London EC1R 5JB; Telephone Editorial 01-278 6556, Advertising 01-278 6552

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Cover: Walt Disney Productions

NEXT MONTH

What can you do with old copies of Computer & Video Games& They don't make very good paper hats and are not particularly adept at jamming delinquent Rampacks into place.

So why not keep them for future reference in a bright glossy binder complete with a **Computer & Video Games** logo.

Then when you want to look back and relive your favourite Bugs script, or check up on that obscure company which produces a speech-synthesising joystick for the UK 101, which we mentioned in Hardcore, then you will have a ready library of neatly packaged **C&VG** issues, looking as good as the day you picked them off your newsagent's shelf. More details and a form to fill in on page 17.

● Don't be ashamed of the bugs that find their way into your programs, take them out with you. **Computer & Video Games** is the only magazine which can put a Bug on your chest. We have a new line in T-shirts which feature a rampaging Bug, behaving in the manner we have come to expect from Screaming foul-up. Turn to page 17 to see what awaits your chest.



Not getting a regular copy of *Computer & Video Games* eh! How do you expect your micro to work proper if you aren't reading the magazine every issue? And you with a nice little computer like that too.

It would be a real shame if anything should happen to it. Vulnerable things computers — especially if someone should start poking them around. S'pose one day you dropped a line into your computer and didn't get a byte huh?

Of course, I can't promise that if you had a regular copy of C&VG on order, your rampack would mysteriously stop wobbling overnight . . . but who can tell eh . . .

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NEXT MONTH

A Sharp Defender game which has produced "Ooohs" and "Aaahs" of delight in the C&VG office when we tried it out, will be gracing our October issue. This is the issue which puts the capital G back in the games section of our magazine and we think we have picked out 10 games which will prove an inspiration to all our aspiring programmers.

October is also the last issue of entries eligible for our programmer of the year competition and the standard should prove pretty high. So please write in and let us know which game gets your vote.

Also for perusal next month, is Space Watch, a game which takes a very different look at invaders from outer space . . . you have to befriend them! Will it ever catch on?

Wild Strawberries is the name given to a version of Alien Panic, Kamikaze send the invaders into shutes but can you keep them bottled up?

There's a competition for those of you who have read this issue's piece on Tron and can't wait to find out more about this amazing film.

All this just one month away . . .

NEXT MONTH

How did you fare in our World Cup Competition? To predict a 1,2,3 of Italy, West Germany and Poland you needed clairvoyance rather than a football brain.

But the World Cup Manager game we featured in our June issue did have some measure of success in predicting the results individually as listeners to London's Capital Radio may already have heard.

A few brief alterations were made to the game, which runs on a Sharp MZ-80K, to enable it to play any one-off game. Then it was sent along to Capital Radio's Euston offices to have the squads and tactics of each team keyed in and the games played out to give a prediction of the result, the mornings before the games were played.

Capital reporter Rob MacKenzie was given the job of running the games through the Sharp and he claims a 75 percent success rate on the results, if not the actual scorelines.

"We took an average over ten games and had a fairly high level of success. Our most memorable success was the Brazil-Russia game when, not only did we get the result right, but we also predicted the late goal."

BUGS BEATEN!

A BBC Microcomputer has been won by Kevin Williams of Sutton Coldfield, West Midlands in our Beat the Bugs Competition published in our June issue.

Readers were asked to write a program to solve the puzzle which was given away free wit the magazine in the shortest time possible. Kevin managed to beat all other entrants with a program written on his Acorn Atom which beat the Bugs in the incredible time of less than one second.

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ROYALTY RIGHTS . . .

Dear Sir,
Could you please tell me what the going royalty rates are for ZX81 programs submitted to large ZX software companies, in particular the companies which produce 16K Basic games on cassette?

Also could you put that into monetary terms after say 1,000 cassettes had been sold.

Richard Hessler,
Bonnyrigg,
Edinburgh.

Editor's reply: Royalty rates vary, depending on the software house you deal with, but a reasonable average seems to be 15 percent.

If 1,000 cassettes are sold at £5.00 plus VAT, my calculator works this out at £750. But a sale of 1,000 is still very rare for any cassette.

VARIABLE PUCKMAN

Dear Sir,
After playing the excellent Minotaur program on my VIC-20, I decided to have a go at converting the Pet program called Puckman to run on my VIC.

A change was made to a few variables, the layout of the maze, and I left out the lengthy instructions so that it would fit inside 3.5K.

The program ran, but soon crashed after a few loops of the game, with an "Out of memory error" message.

On inspection of the original listing lines 250 and 350 use "go to's" to exit from a "gosub" routine and a "goto" is used to re-run the program, to keep the top score intact. The solution was to change all the gosubs to gotos, and it worked.

Another problem I encountered turned out to be a bug in my VIC, where VAL(TI$) was used in lines 50 and 60. An '@' symbol flickered in the top left hand corner of the screen (when the screen colour was black), but this was cured by changing VAL(TI$) to TI and multiplying the associated variables by 60 (jiffies).

To make the game more realistic, I have used the user defined graphic capabilities of the VIC, with good results, and all that is left now is to program some sounds into it.

May I just say how much I look forward to your magazine each month, and hope that the above tips might help other VIC users.

I would also like to know if it would be possible to produce a badge and teeshirt with Computer and Video Games logo, not forgetting the lovable Bugs, for all your readers to wear?

Michael Maxwell,
Andover,
Hampshire.

Editor's reply: Our thanks to Michael and the other readers who have reproduced our Pet games listings in VIC-20 form. I hope we can get around to printing them all one day.

Many of our readers have been asking about T-shirts. Just turn to page 17 of this issue where you'll find all the details.

SUBMARINE CHALLENGE

Dear Sir,
In the April edition of *C&VG* you printed a game called Sub-Attack for the VIC-20 and said the highest score so far was 1100. After programming my VIC-20, I managed to reach a score of 2,420 points. Has any other VIC owner managed to beat this score?

Christopher Hazell,
Rochester,
Kent.

RAINBOW CHASERS

Dear Sir,
Quite a lot of arcade players know how to get a "Rainbow" on Space Invaders, but some of us can go one better. A 500 bonus "Rainbow" is achieved on the Part II machines by leaving the five left side invaders to last and then shooting them in a top to bottom order.

But an 800 bonus score can be notched up by shooting the same five invaders in the order: second row, third row, fourth row, fifth row, first row. This is also known as a "spray", I hope you are interested.

My latest high scores are: Missile Command, 5,880,050; Scramble 811,500; Enigma II 590,250; Space Fire Bird 198,620; Gorf 205,190; and Lunar Rescue 450,010.

Keep up the good work. I like Arcade Action and I look forward to reading it every month.

The front covers are very eye-catching.

Martin Lund,
Pinham Road,
Skipton,
North Yorks.



QUADCUBE QUERY

Dear Sir
Could you please tell me where I would be able to obtain a Quadcube, you featured in your April edition.

Richard Butlin,
Heysham,
Lancashire.

Editor's reply: A Quadcube can be obtained from software specialists Workforce which is based at 140 Wilsden Avenue, Luton, Bedfordshire. The telephone number is Luton 418577.

MORE GAMES ON THE WAY

Dear Sir,
Could you please print some interesting games for the ZX Spectrum — I know that only a few are available at the moment but by the time August's issue of your magazine is on the streets many more people should have received theirs.

Mark McLean
Fareham
Hampshire

Editor's reply: We did manage to get our first ZX Spectrum game in time for the August issue, Mark and you also find Diamond Draughts in this month's offering. We hope to keep the Spectrum games coming in the future . . . watch out for Space Watch, next month.

MAILBAG

SATISFIED CUSTOMER

Dear Sir,
I'd like, through your pages, to send a thank-you to one of your advertisers, DK'tronics of Great Yarmouth. My son sent off for their keyboard for the ZX81. When the keyboard/ZX81 combination didn't work properly, I posted it to DK'tronics who promptly returned it in perfect working order.

To my delight the repair was made free of charge — although it seems that the fault lay in a joint that was poorly soldered at the Sinclair factory.

Incidentally, if any reader is considering an add-on keyboard for the ZX81 and is worried about having to perform the necessary soldering, just do what I did. Visit your local TV rental shop, go round the back door to have a word with one of the technicians and get a beautiful job done for the price of a drink!

R. Millington,
Kingston,
Surrey

THE DATA DEBATE . . .

Dear Sir,
Many of your readers must have blushed with shame, as I did, on reading your reply to 13-year-old Master Sacaloff. The idea that the ZX81 puts data from a REM in line 1 into a special buffer may be interesting but it is pure fantasy (a polite word for rubbish).

He will not have to read many of the excellent books on the market to discover that there is no such buffer and that the ZX81 treats line 1 in exactly the same way as every other line.

What you should have told him is that he is absolutely right and that the computer does indeed ignore statements in a REM and so it does not know that there is any machine code there until you tell it so by using the USR function.

Since the first line of any program, no matter what its number, always begins at address 16509 and since the first four bytes are taken up by the line number and line length, and the fifth will be the word REM itself, the data starts at address 16514.

The command RAND USR 16514 tells the computer to go to that address and to treat what it finds there as machine code which is exactly what he wants. In fact machine code can be put in a REM in any line so long as one can find its address (and there are several ways of doing that).

Dr. L. F. W. Rowe,
Exeter, Devon.

Editor's reply: Dr. Rowe, is of course right. My original explanation had the fault of over-simplification. The "buffer" that I was referring to, in fact, started at location 16514! This seemed to me the simplest way of explaining things as I did not want to get involved with how the ZX81 actually stored a program — that would take quite a lengthy article to do it justice, and just to confuse matters, the Spectrum is more than subtly different!

You were also quite right about the machine code data going anywhere in a program — and you rightly pointed out that there are ways of accessing the right address. Again this is a more difficult problem for some of our readers and simplification, as long as it is not misleading, is sometimes better than a long and too technical answer.

WHAT, NO CARTOON!

Dear Sir,
What happened to August's Arcade Action pages? I turned to them as usual for my monthly laugh at Ian Bennett's delightful cartoons and what did I find . . . ? No cartoon!

Has Mr Bennett run out of ideas so soon? If so perhaps I could encourage him by praising his Asteroids cartoon in the June issue. It reduced myself — and a few colleagues with a similar sense of humour — to tears.

Trevor Ruddick,
Slough,
Berkshire.

Editor's reply: No, Ian hasn't run out of ideas Mr Ruddick. It's just that occasionally we run out of space on our Arcade Action pages. To prove that Ian is still taking a humorous look at the arcade scene, I have included the cartoon which was pulled out of our August issue. I hope it raises a few chuckles!



MONKEY BUSINESS . . .

Dear Sir,
Regarding your Donkey Kong tips in the June issue I was suprised to see a very important tip left out. On the third screen a player should go to the top of the second set of ladders jump out any lift wait about two seconds till his jumping foot clears the first platform and then jump onto the second platform, this does not result in a long plunge to the bottom as you might suspect it to but you will land safely on the ledge.

This comes in handy on higher levels as you get a higher bonus and avoid dodging the oncoming springs.

John Dickson,
Cumberland Road,
London

SNAKES FAN SPEAKS OUT

Dear Sir,
Thank you for an excellent magazine which I read avidly every month. And thank-you to A. Woral for the lovely Snakes and Ladders program in your July issue.

I would like to suggest, however, that a simple amendment to one program line makes the players easier to follow as they move around the board by displaying them on the target square before moving them up a ladder or down a snake. Simply change line 210 to: 210 Z=BBR;GOS.v;GOS.t;Y=BBR; BBR=Z;GOS.u;BBR=Y

I am presently awaiting delivery of a BBC ROM for the Acorn Atom and will hopefully send you some programs written with it — when it eventually arrives.

Adrian Pegg,
Sun Street,
Derby

MICROS MAKE NICER FOLK

Dear Sir,
Is the micro business different? I live out in the wilds of Cumbria, so all my problems and enquiries are sorted out by telephone.

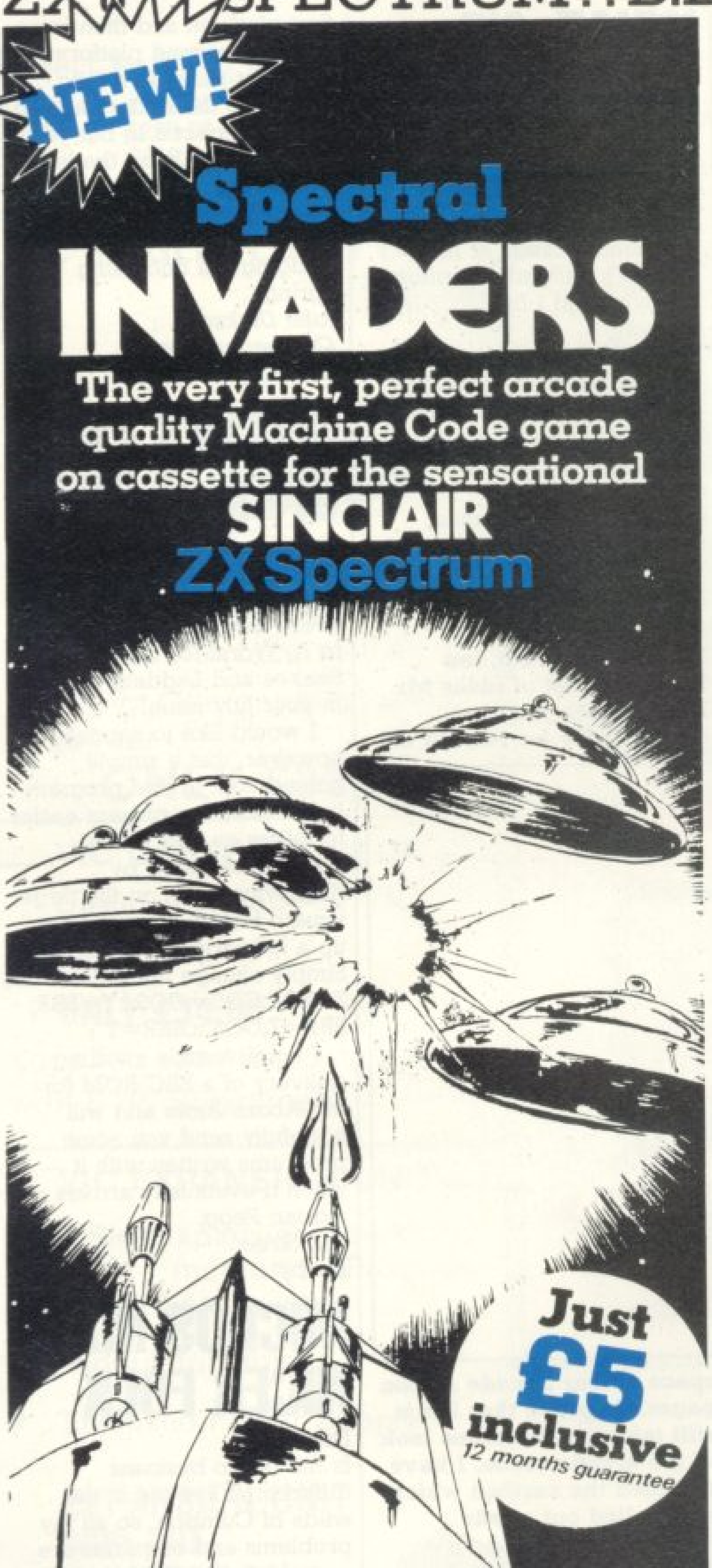
And, what do I come up against, no *not* indifference, but keen interest and politeness, and even humour, at times for questions of no monetary rewards.

My special thanks to Stack of Liverpool, and Anglo American of Birmingham.

If this is what having a computer means, then long may you all prosper.

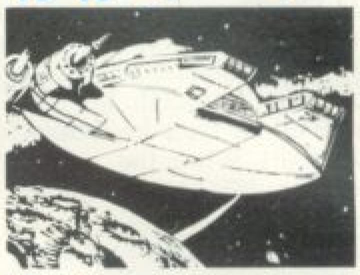
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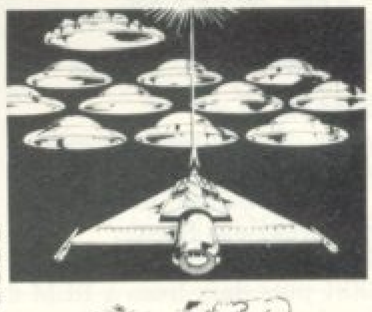
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PLEA FROM THE ATARI

Dear Sir,
May I first congratulate you on the content, value for money and the information on video games provided by your excellent magazine which I have taken from issue number one.

However, as an Atari 400 owner I have one complaint. I feel that the monthly games program for the Ataris are slowly deteriorating.

In fact the last two published, i.e. Double Barrel and Boing, are an insult to the capabilities of an Atari.

In times likes these where W. H. Smith bookracks offer five or six mags per month

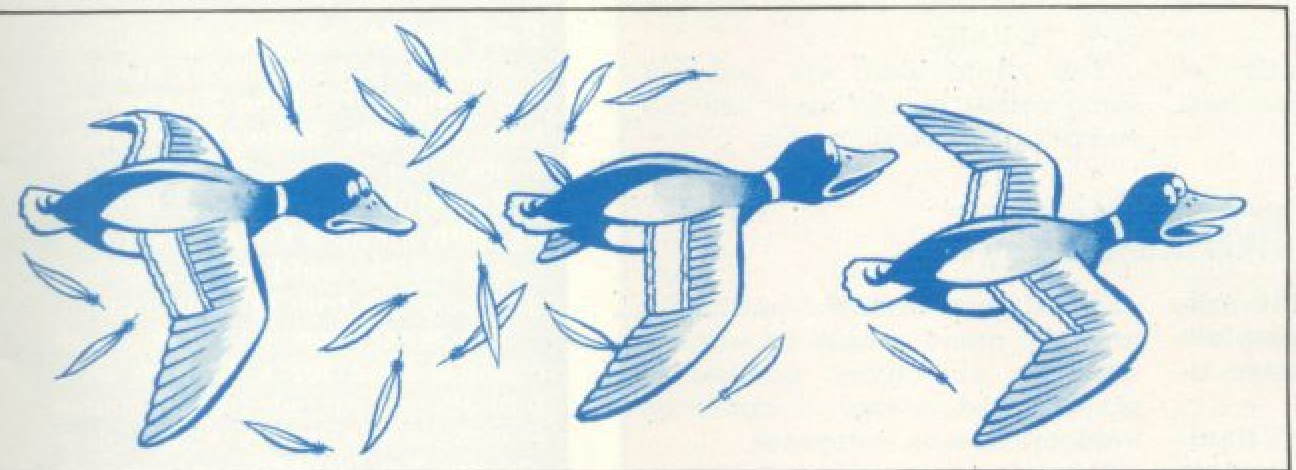


Illustration: Terry Rogers

solely for Sinclair owners (and several other mags that tend to favour Acorn, BBC, VIC etc.), don't you think you could provide a little more interest for the minority?

Come on *C&VG* let's have more interesting listings up to the standard of "Mini Golf" and "Changing Hearts". Are we Atari owners to be penalised and neglected for buying American?

Eric Bacon,
Worksop,
Nottinghamshire.

Editor's reply: As you pointed out Eric, the Atari has had some good long games published for it in *C&VG*. We do try and achieve a balance by offering a few shorter programs for Atari owners who cannot find the time to type out a massive listing.

But perhaps the most important point I can make from your letter, is that this magazine is only as good as its contributors — in this case that means Atari owners who are willing to send in games listings.

We pay £10 for each published listing and there is a chance for readers to be entered for our Game of the Year Competition — first prize being a trip for two to Paris complete with spending money. You still have two months to enter.

THE NEWS IS AT FAULT

Dear Data Manipulator,
I would like to say what an invader-zapping piece of literature your magazine is.

I have scanned through some other computer magazines but only a few have been anywhere near your standard. The rest have been calculated as being processed garbage!

I especially like the Games News bit.

But may I point out one slight fault — only on a few of the games in this section do you express your opinion. You could try putting ratings at the end of each game review. For example: value for money, use of graphics, and quality of game.

Also, in the April issue — in the American Dreams section — you mentioned the Commodore Ultimax. How large is the memory of this unit?

Are there disc drives or colour/sound boards for the ZX81? If so, how much are they and who sells them?

Simon Spencer,
Ormskirk,
Lancs.

Editors reply: We are often informed of games to include in the news pages before the finished product is available. If we didn't write about them until the cartridge was on sale by the time it would be published the game would be old. That is also why we do not use a rating system for the games. In depth analyses of games are kept to the review pages, where a rating system will soon be introduced.

Commodore Business Machines has renamed the European version of Ultimax the VIC-10 which was unveiled at the Hanover Fair in March. The basic system has a memory capacity of 2K and it should be available in September, costing £100.

There are no disc drives available for the ZX81 computer and none are likely to be developed.

BATTLE ZONE EXPERIENCES

Dear Sir,
I am writing in with regard to the arcade news section of the July issue of **Computer and Video Games**, in particular to the Battle Zone score printed.

I am not saying that the explanation below is the cause of the five million score printed out but I cannot imagine one person playing battle zone for 6 hours on the trot.

When I was new to Battle Zone I had wierd experiences with the scoring. Suddenly it went haywire and gave me a really high score for nothing. This is not an isolated happening as it has happened on two machines that I have used — if these scores are to be recorded then my two highest scores are 74,032,000 and 56,280,000.

Incidentally, my printed score of 319,000 has been broken by at least two aquaintances of mine reportedly both scoring over 500,000.

As I say, I believe it may be possible to score 5½ million on Battle Zone but it would take a heck of a lot of effort to stay awake.

Mark McLean,
Fareham,
Hampshire.

WHEN DAD TAKES OVER

Dear Sir,
My family have recently received a BBC microcomputer, I used it about seven times and I am very impressed. But I never seem to be able to get on it any more.

I wake up in the morning to hear a tap tapping on the keys. I come home from school and my Dad is using it again.

My Dad is new to computing and is very keen. He has been working on an accounts program about a week now and today he came into the kitchen and explained that he had run out of memory space.

I was quite amazed at this as it is his first program and the computer has 32K.

I am very pleased that you are producing OWL for the computer and hope you will keep it up.

Stephen Seymour,
Ropley,
Hampshire.

SPEEDING UP THE TRS-80

Dear Sir,
I had the same problem as C. Bennett which was that we found the TRS-80 Basic was rather slow. I overcame this problem, though by learning machine code and imbedding it into my basic programs. This did wonders to my programs and now I write fast exciting games. Don't be afraid to use machine code.

Another idea is to buy a compiler which would speed up your game no end but this could be quite expensive.

I hope I have helped people with my ideas.

D. Cromwell,
Letchworth,
Hertfordshire.

WE'RE AIMING FOR PERFECTION

The perfect computer game, I decided, should be based on strategy.

It needed plenty of scope for innovative tactics, fast action, some pretty neat algorithms to keep the human player guessing, a simple set of rules and an original and imaginative story line.

Mine involved a computer-controlled team of 12 necromancers who kept up a constant stream of the most undesirable spells aimed at a prince with the sole aim of turning him into a frog.

While the player had an apothecary of mages (about 12) and a magic talisman and had to counter every spell hurled against him or develop a taste for flies. I was going to call it Third Toe on the Left Flipper — or something just as imaginative — and it was going to be the best game ever.

But I took a look at the programming expertise involved — and it was promptly shelved. I'd stolen the idea from a fantasy novel anyway. But with the help of a software company like Psion and the backing of Sinclair, I am still convinced that every home would have been the richer for a copy of Third Toe of the Left Flipper.

If you've ever dreamt up the perfect computer game but found that putting it into lines of code was beyond you, then this issue of C&VG could be your saviour.

In conjunction with Sinclair Research and top software house Psion, we are giving readers the chance to get their game idea into production and onto the shelves of W. H. Smith.

You could also win yourself some prizes on the way. See the competition details below.

ORIGINAL AND IMAGINATIVE . . .

The five new Sinclair ZX81 cassettes provide a pretty complete base to any games software library.

All for the ZX81 with 16K Rampack and written by top Sinclair software house, Psion, we are offering five sets of these cassettes to the winner and four runners-up in our Computer Game Competition.

The cassettes on offer are: Flight Simulation; Space Raiders, a space invaders game which shares cassette space with Bomber; Sorcerer's Island and Perilous Swamp, two adventures on one cassette; Chess and Backgammon.

As well as these, our winner will receive a Sinclair printer or a £60 voucher to put towards any Sinclair product he chooses.

But the real prize is a visit to Psion to see how a commercial software house operates and a chance to talk over your game ideas with the Psion programmers and see if it is practical to write the game and sell it under the Sinclair banner. If the game is good enough Psion will undertake to write it and Sinclair to market it.

What we want from you is a game title, a detailed outline of how the game should be played, with the objectives, number of players and a way it could be implemented on computer.

It can be a space invaders-type reaction game or a new look at adventure games. It can be as strategic as chess or as baffling as a Rubik's Cube.

If it is set to a storyline then you should give us the tale behind it. If it involves carefully computed tactics then you could provide the necessary algorithms to give the machine a good chance of winning.

We are looking for games that are original and imaginative but remember they must also be practical.

All entries will be the property of Psion. And no employees of EMAP, Psion or Sinclair Research may enter the competition. The judges decision is final and no correspondence will be entered into.

The closing date is 16 September 1982 and entries should be addressed to Computer Game Competition, Computer & Video Games, Durrant House, 8 Herbal Hill, London EC1R 5JB to reach us by then.

BRAINWARE

The answers to our August Mind Routine problem is: 4683
$7+2+1+2\times6-2+3+7-4+3\times5-3-2\times4\times3+3$

The correct solution to last month's Nevera Crossword is printed right and the winners names will be published in next month's issue.

For more puzzles to test your brain power simply turn to page 82 where you'll find the puzzling Mind Routine and our monthly wordgame the Nevera Crossword.

NOW SOME PINBA

How would you like to impress visitors to your home by displaying a super flashing Electra pinball in your hallway or living room?

You still have a month to come up with an idea for an electronic game which could make a pinball dream come true in your home.

We want you to think of an original idea for a feature on a pinball or an electronic game which would inhance its playability. You could even come up



ANSWERS

R	E	M	O	T	E	C	O	N	T	R	O	L
U			G			O	X	O		U		U
S	T	O	R	E		D		R	U	B	I	K
S			E			I		T				E
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A		A		T		G		S		H		K
N	O	R	M	A	L		S	T	E	A	D	Y
G		D		R		F		A		R		W
A	S	S	E	M	B	L	E	R		P		A
M				I		Y			T			L
B	A	R	O	N		O		S	H	O	C	K
I		E		E	L	F			O			E
T	O	M	B	S	O	F	T	E	R	R	O	R

BALL WIZARDRY

with an idea for an entirely new machine.

Bally hope to find a completely fresh outlook to arcade games. It can be a single feature on a game or a whole new concept but it has to be practical so bear in mind the following criteria.

- Physical dimensions
- The game should be capable of being mass-producted.
- Cost.
- Weight.
- That it is safe to be used by the arcade player.
- The idea must not be stolen from any other arcade or pinball machine.
- And most important, it should be creative and original.

The Bally Pinball Division will present an Electra pinball machine to the grand prize winner. All entires will be judged by the Bally Pinball Division's new product board and announced in Computer & Video Games. All entries will be the property of the Bally Pinball Division and the entrants will assign all rights, patents and privileges of their design to the Bally Pinball Division.

No employees of Bally or Computer & Video Games or their relatives may enter the competition. The judges decision is final and no correspondence will be entered into.

Send your entries to The Pinball Competition, Computer & Video Games, Durrant House, 8 Herbal Hill, London EC1R 5JB before September 16th 1982.

NOW BUSHCAT SPEAKS OUT . . .

Our Starweb game is up and running and interstellar conflict is just around the corner.

In our May issue play-by-mail games company, Flying Buffalo offered 15 readers the chance of competing in a free C&VG Starweb game and we promised to keep the rest of you in touch with events once the game had progressed sufficiently for players giving notice of their intentions not to suffer as a result of these indiscretions.

First writer on the game. Just giving his early impressions and perhaps a better understanding of computer moderated gaming is Paul Hardy, alias Bushcat the Pirate — the sort of character who gives space fiends a bad name. Take it away Bushcat . .

Starweb is role-playing Adventure-style set in space where, due to the foresight of some extinct super-race each star system is linked to three others by a transportation network allowing instantaneous point-to-point travel.

The characters within this game have differing objectives, with Apostles converting populations, Berserkers decimating them, Merchants trading between star systems and so on. I play the part of Bushcat the Pirate who gets his kicks plundering as do all good pirates.

Each planet is characterised by a population level, a varying ability to generate raw materials each turn, and an industrial base. Some planets lend themselves to ship-building, others to supplying raw materials and some to plundering. I have, in fact, found a totally empty planet. Tha one is earmarked for a bit of wanton destruction.

Each turn, I write orders for my fleets and possessions, specifying where fleets are to move, if they are to carry anything, who to fire at, which planets to build ships and all the nitty gritty of running an empire. The order sheets are then sent to a Midlands P.O. box which uses it's superior intellect to sort out everyone's moves, check them for validity, resolve conflicts between rival sets of orders and then returns a listing of planets visited, planets hinted at and current fleet status.

I have not made contact with anyone yet, but when I do they will get a good drubbing. Contacts are listed automatically and the game allows such contacts to communicate via diplomatic postcards.

I have noted a couple of "funnies" so far, for example the fleet that went two places at once. But on the whole I am getting to grips with everything, including the very detailed rulebook which caused a few late nights when it arrived. Starweb looks as though it will develop into an excellent game, if only the turn-around time can be reduced.

OUR WORLD CUP WINNERS!

Paoulo Rossi and co. now look as if they were always intended to win the world cup on that hot sweaty Sunday night in Madrid.

But who would have said so a couple of months before? Two of our readers that's who — in the great Silica Shop and Computer and Video Games world cup competition.

Silica Shop asked our readers to predict who would be first, second, and third in the world cup to win a £100's worth of computer equipment or an Atari 2600 TV Games Centre.

Victor Thorn of Dagenham and Malcolm Stowey of Mangotsfield near Bristol both predicted that Italy would win and Germany be runners up, though neither of them predicted the third place team — Poland.

As there was no outright winner the competition organisers have decided to split the prize between Victor and Malcolm who will both receive a voucher for £50's worth of computer equipment.

Nigel Judd of Silica shop said, "We had hundreds of entrants that included Brazil in some combination of first second and third — but Victor and Mathew were the only two out of over six hundred entrants who predicted the outcome of the final.

spectrum

Spectrum is a new, rapidly expanding group of independent retailers who specialise in selling a range of popular home computers.

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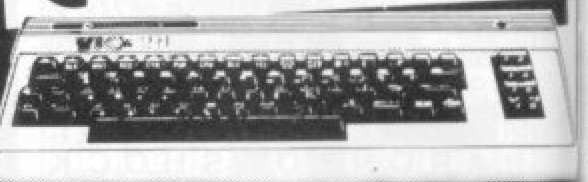
After sales care is also well catered for. Our own Spectrum Service Centres will insure that should your machine 'go down' we will get it up and running as quickly as possible. We can also offer extended warranties at reasonable prices.

When it comes to mail order delivery we use Securicor for despatch to anywhere in the British Isles. The cost is low and the service is good. Further details are available from your local shop at the time of ordering.

Finally, we should point out that although not every Spectrum centre carries every advertised item, they can always be obtained quickly from our central warehouse. If you have any difficulty, please telephone Spectrum Customer Service on (0727) 66646.

Spectrum Computer Group is a division of Spectrum (UK) Ltd - Britain's largest photographic retailing group.

commodore



The VIC 20 really is extraordinary value for money. It does so much for so little.

It's fully expandable to 27½K user RAM, has a full size typewriter keyboard and plugs straight into your home TV.

COMMODORE VIC 20

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£199.99 INC.VAT

Micro soft 'BASIC' is standard but additional machine language is available via plug in cartridges. There is also a choice of other programs for chess, music and languages as well as games. Printer disk drive and other peripherals, software and books are all available to further expand your use and enjoyment.

	EXC VAT	INC VAT
VIC C2N cassette unit	£39.09	£44.95
VIC Printer (plain paper, tractor)	£200.00	£230.00
VIC Single floppy disc drive (5¼")	£344.35	£396.00
3K RAM expansion cartridge	£26.04	£29.95
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GAMES		
Programmers Aid cartridge	£30.39	£34.95
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Introduction to Basic (1)	£13.00	£14.95
"Avenger" (ROM)	£17.35	£19.95
"Star Battle" (ROM)	£17.35	£19.95
"Jelly Monsters" (ROM)	£17.35	£19.95
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"Road Race" (ROM)	£17.35	£19.95
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"Blitz" cassette	£4.34	£4.99
BOOKS		
Learn Computer Programming with the Commodore VIC	£1.95	No VAT
VIC Revealed	£10.00	No VAT
VIC 20 Programmers Reference Guide	£14.95	No VAT
VIC Computing Magazine	£0.95	No VAT

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Developed by the Company famous for its TV and arcade games the Atari Computers have superb colour graphics and facilities for the manipulation of visuals on the screen.

In-built "player-missile-graphics" enable the user to compose games to very professional standards. Any key on the keyboard can be made to produce any character the user wishes on the screen. Atari Computers have an extra microprocessor onboard especially to enable these unique features. There are over 200 programmable colours and tones and a wide range of programmable sounds.

Plug a "BASIC" cartridge in and you have a comprehensive computer.

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The model 400 has 16K of RAM and a touch sensitive keyboard. The 800 model has a professional style typewriter keyboard and a memory which is user expandable to 48K. Add disk drives (up to 4) and a printer and you have a system of adequate power for business uses.

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Hatfield Herts

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nascom



SPECIAL EDITION! UNIQUE TO SPECTRUM

The Nascom is a British designed and built microcomputer and one of the first home micros to appear in this country, some five years ago.

Since then, it has been developed into one of the most powerful and expandable systems around.

It can have up to 206K onboard memory, combined with superb colour graphics, disk drives, printers and various input/output facilities can be added.

Such is the versatility of this micro that it has been adopted for numerous commercial applications including hotel booking systems, blood grouping, weaponry and satellite tracking.

Previously looked upon as a machine for the knowledgeable hobbyist only Spectrum now bring you the opportunity to embark upon this remarkable sphere of computing in the easiest possible way. A ready to plug in and use 'SPECIAL EDITION' Nascom programmable in machine code or BASIC is now available from us. If you are serious about computing the 'SPECIAL EDITION' is your starter pack. The initial machine provides 8K of memory but a simple plug in board upgrades your computer to 56K.

THE NASCOM 'SPECIAL EDITION'

£429.95

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£75 OF FREE SOFTWARE WITH THE MZ80A



The MZ80A is the newcomer to the Sharp range with the serious user very much in mind in the design.

A complete stand-alone 48K system incorporating a profiled typewriter keyboard with numeric pad and a 9" green display screen. The "BASIC" contains a number of very useful additions over the previous models.

A full line up of peripherals further add to the versatility of this machine.

INCLUDES £75 OF FREE SOFTWARE.

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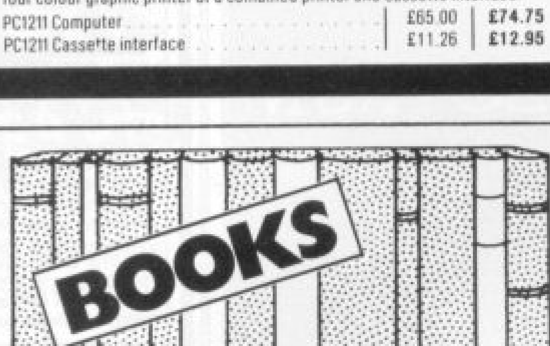
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* 132 col printer, inc. cable, I/O card and ROM	£845.00	£971.75
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ZX81 GAMES

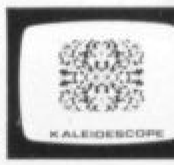
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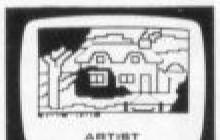
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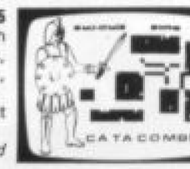


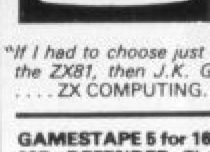
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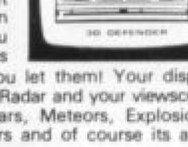
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A SMASH HIT at the ZX Microfair (most of the other software houses wanted a copy), a game not to be missed!





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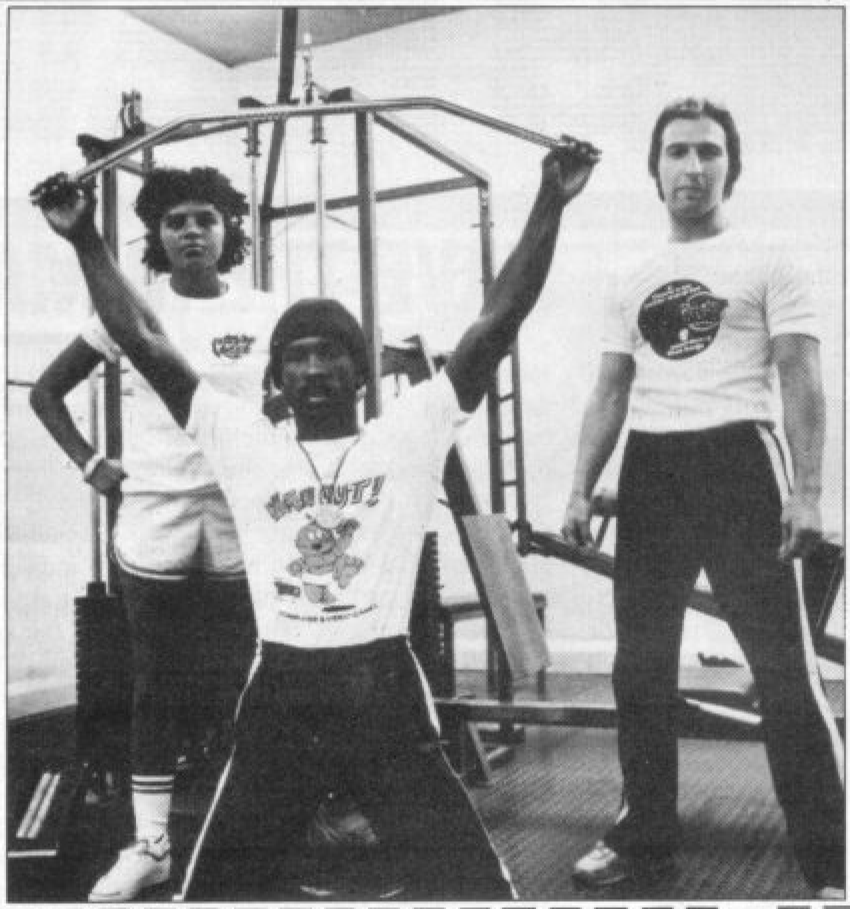
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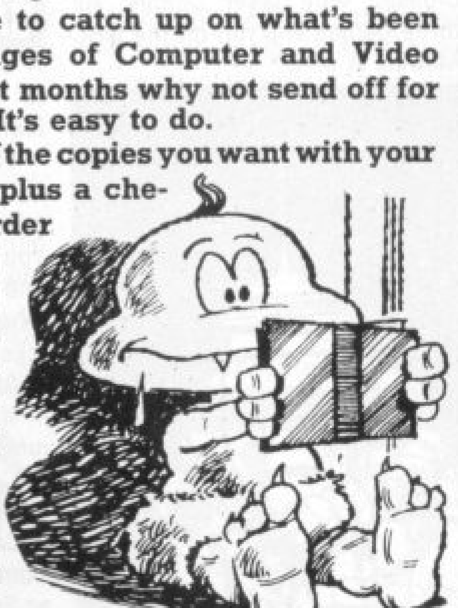
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GAMES NEWS

I THOUGHT I SAW A PUDDY-CAT!

CAT AND MOUSE

Are you a man or a mouse? Well, you are definitely a mouse in a new game called Cat and Mouse. You crawl around a maze, hiding from two hungry cats who stalk the corridors searching for food. Guess what their favourite food is?

You're right — it's you. So if you don't want to end up as a snack between bowls of Kit-E-Kat, fast reactions are the key to survival.

The number of cats chasing you can be varied. You can choose one or two feline opponents in the chase. There are four different speeds to choose from.

For the advanced player, the game has an added difficulty. The cats are programmed to randomly turn either left or right at maze junctions.

You need to be a very sharp mouse indeed to guess which way the devious moggies are going to turn.

If you manage to successfully negotiate your way out of the maze without being devoured by the cats the game will then select, at random, a new maze. But tread carefully — the cats are still prowling around.

Cat and Mouse is available from Leeds-based Program Power at £4.95 plus VAT and runs on the BBC Model A or B.



SAVE THE HUMANOIDS

DEFENDER

The laser ship is patrolling the rocky terrain of a distant planet, defending and delivering the humanoids from the clutches of the alien landers.

A scanner in the top section of the screen shows the whole plane surface, and can be used for long range reconnaisance. The lower part of the screen displays the section over which the laser ship is flying.

In this new version of Defender the landers hover around, the surface on the lookout for prey which they can drag off into space. As a lander ascends with a humanoid, you can destroy it with your lasers, or with the "smart" bombs, which disintegrate everything hostile in sight. Having annihilated the lander, you can intercept the plummeting human, before setting him back down on the surface.

Should you fail to rescue the poor individual before the lander craft carrying him reaches the top of the screen, the lander will mutate. While contending with the faster mutants, you are also attacked by bombers, pods, and swarmers, all of which are to be avoided at all costs, and killed before going on to the next wave. But beware of those pods for they release an angry mob of swarmers when you hit them.

If the landers manage to steal away all the humanoids the planet will explode and all the landers become mutants. After every four attack waves you get a new plant, and a new set of humanoids to defend. You have three ships with an extra one ship and smart bomb for scoring 1,000 points.

A very close copy of the arcade version, this Defender runs on the BBC Microcomputer Model B and is available from the Cambridge-based company Acornsoft at a cost of £9.95, inclusive of VAT, postage and packing.

THE MERCILESS METAL MONSTERS

ROBOT CHASE

The robots of Zistel Three are programmed to show no mercy to any aliens found searching the planets barren terrain for a "matter transmitter", which is the only means of escape from this cruel corner of the galaxy.

If the robots catch you, they are programmed to self destruct blowing both you and them to pieces. The robots can be made slower or faster depending on the skill level you select.

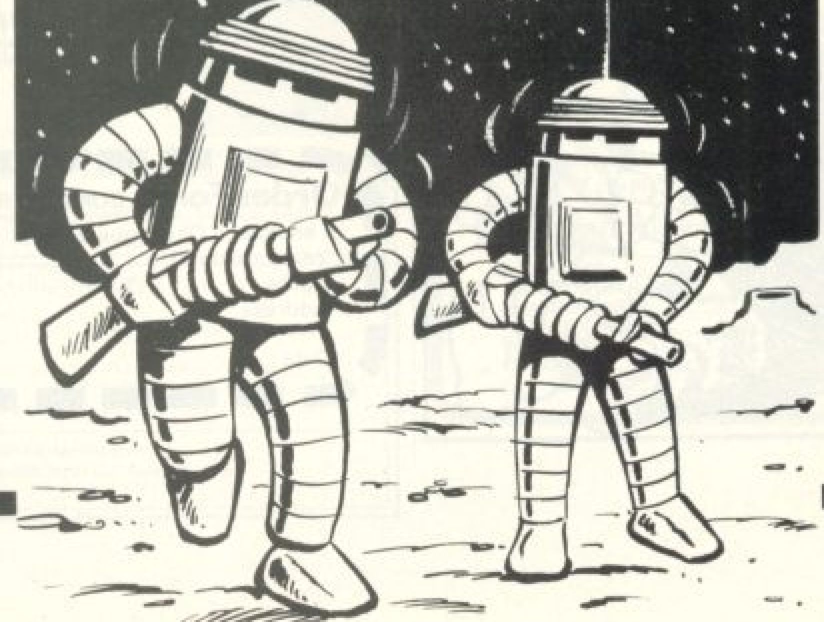
Zistel Three is also ravaged by high voltage electronic winds which blow up from nowhere at very short notice.

If you manage to evade the robots until half time you will be given a Robot Jammer hyperjump which sends the robot off to a random position. You are also awarded a personal hyper-jump which will randomly place you elsewhere within the game area.

Robot Chase comes with two other space games in a three game pack from Chelmsford-based Futura Software at £3.99.

For your money you also get U.F.O. Invasion where your only defence from invading ships is a tri-beam laser gun mounted high on the top of a sky defence tower.

The third game in this package is Corridor of Lasers, a space age treasure hunt in which you seek for the gold from a long-since extinct planet. It is hidden somewhere in a corridor criss-crossed with laser beams. All three games will run on the BBC Models A or B.



Illustrations: Terry Rogers

THIS OLD SOLDIER FIGHTS ON

CANNON BALL BLITZ

A belligerent old soldier refuses to leave his wartime enclave high in the Cannon Blitz Hills.

For him the war still rages and he will shower anyone who passes below with cannon balls. You must dodge the cannon balls and escape to the next level where a balloon is waiting to take you out of range.

At the third level of this game — if you get there — you have to jump from platforms onto a moving escalator which takes your little man to the top of the hill.

Cannon Ball Blitz is available from south Croydon-based Spider Software at £19.95 on disc for the Apple II.

GAMES NEWS

TALES FROM ARABIAN CAVERNS

ALI BABA

Open Sesame is bound to be a key word to lead you into caves full of treasure in the Apple II fantasy role playing game Ali Baba and the Forty Thieves.

Experience all the mystery and glamour of the Arabian Nights in the search for treasure and adventure.

You will encounter elves, dwarves and even humans during your quest — and of course the rougish thieves will be around and about throughout your adventure. There are 20 random characters lurking around too — and they are mostly evil types. So watch out!

At first you may simply wish to explore the treasure laden caverns and get away with as much stolen treasure as possible. But as you get more skilful — and if you are feeling chivalrous — there's a beautiful princess waiting to be rescued from Ali Baba and his henchmen.

Ali Baba and the Forty Thieves is available from SBD Software of Richmond, and it costs £19.95.



NEW, IMPROVED INVADERS

ZYGIAN INVADERS

The Zygians are a hybrid breed of invader with more than a few tricks up their sleeves.

Unhappy with heavy losses in previous invasions, the Zygians come armed with a new laser beam gun which can hem you in between two ships. Certain of the Zygian ships also have an advanced metal case which enables them to bounce back missiles at your gun turret.

There is also an added innovation in that the mystery space ships that periodically bleep across the screen can't be relied upon to explode when you hit them — some are programmed to drop out of the sky destroying your turret unless you move it swiftly out of the way.

Zygian Invaders runs on a Commodore Pet and costs £6.00 plus VAT from the Brighton-based company, Simple Software.

SAVE YOUR BACON IN THIS MAZE!

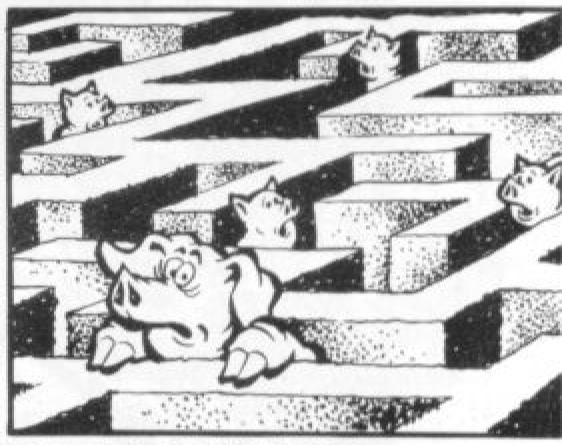
PIGPEN

Porky Pig and her offspring are after you in their maze of a pigpen and they are looking forward to their next meal.

To escape their greedy clutches — or should I say trotters — you have to fill the maze with dots, so restricting their movement.

This novel reverse of the Pacman-type game offers you a choice of one to eight pigs to run away from.

If you successfully fill your maze with dots the game will randomly produce a new maze for you to negotiate. Pigpen is available from Richmond based SBD Software at £17.95 and comes on disk for the Apple II.



BLASTING THE EVIL KLINGONS

TIME TREK

Star Trek fans will welcome the chance to get even with those evil Galactic Pirates — the Klingons — in Time Trek.

While you are waiting for the queues to die down outside your local cinema showing the latest Star Trek movie this game will make a good substitute.

Your Starship Enterprise is armed with photon torpedoes and phasers, which blots out the screen in an energy blast, destroying the Klingons in the process.

The game has 20 different skill levels which change the strengths of the Enterprise and the Klingons phasers.

Unlike many Star Trek games, this version includes all relevant information on one screen presentation. Time Trek comes from Program Power at £7.95 plus VAT for the BBC Model B, or Model A with 32K.

Also new from Program Power this month is an adventure search game called Eldorado Gold.

This is a treasure hunt against a backdrop of saloon bars, six guns, and wild wild women.

Eldorado Gold costs £6.95 plus VAT for the BBC Model B, or the Model A with 32K.

There is also a Pacman type game called Munchyman retailing at £5.95 for the BBC Model B, and a chess program with an educational introduction of a re-run of a challenge match between former chess champions Spassky and Fischer at a cost of £7.95 plus VAT for the Model B.



HARD RAIN IS FALLING

MOONBASE

Moonbase is a peaceful scientific research station on a distant planet. Peaceful, that is, until a sudden meteor shower turns into a relentless onslaught.

As commander of Moonbase the only way to ensure the survival of your crew is to blast the meteors before they can make contact with the base.

You are armed with three angled laser guns so you will have to fire quickly and accurately if the Moonbase is to survive. Moonbase comes on a tape with a 3D maze game from the Great Yarmouth-based company Dk'tronics and costs £5.95.

Illustrations: Terry Rogers

JUST WHEN YOU THOUGHT IT WAS SAFE TO GO BACK TO THE KEYBOARD . . .



ASYLUM II

. . . THE ADVENTURE CONTINUES. The graphics wizardry of Frank Corr and the deadly imagination of William Denman have once again joined forces to produce a world of evil genius. Hordes of maddened army ants will pick your bones. Killer clowns will send you screaming. Clever guards will tax your ingenuity. And a hundred other confrontations with a nightmare world may leave you a babbling idiot.

Graphics are instantaneous and three-dimensional. The building has over 1,500 locations. Full English sentences may be entered, with comprehension surpassing the legendary Asylum I.

You need not have seen Asylum I in order to master Asylum II. You *will* need cunning and stealth to survive this newest world of insanity.

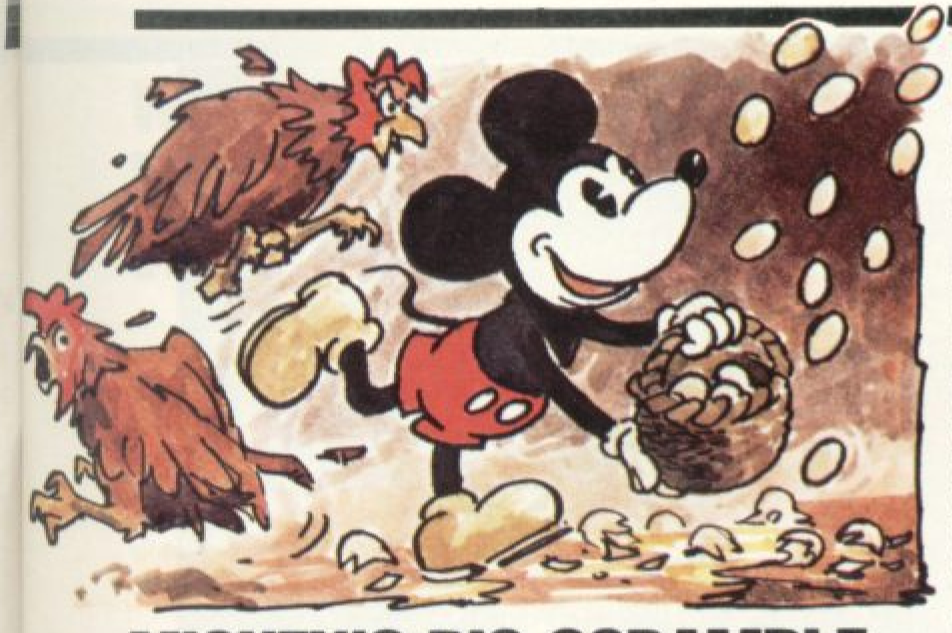
The industry greeted Asylum I with one word. INCREDIBLE. For Asylum II, only one word is required . . . AWESOME!

TRS80 Model I/Model III/Tape: £11.75 Disk: £13.50

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GAMES NEWS



MICKEY'S BIG SCRAMBLE

GAME AND WATCH

Count all your eggs before they're hatched and you could be on your way to a new high score on the latest offering in the Game and Watch series.

Called Mickey Mouse, this game features the original Walt Disney favourite in the frantic action in the hen-house. The four chickens in Mickey's yard put the Goose that laid the Golden Egg to shame, as they keep a constant stream of newly-laid goodies tumbling down the shelves of the coop.

Mickey, armed with a basket and a worried expression has to guess which of his four layers' eggs will next drop from the coop shelves and make sure his basket is underneath it when the egg falls earthwards. Dropping eggs hatch upon landing and when four chicks have got away it's all over.

Minnie is also on hand to shout instruction from a nearby window and ring an alarm bell when the need arises.

Also new to the series is Popeye. The spinach-chomping cartoon hero must catch garbage thrown at him by his ever-loving Olive while balancing precariously on a little boat in the harbour.

Meanwhile, Bluto, the arch villain, tries his best to catch Popeye off-balance and knock him into the water by use of a hammer and his mighty fist. Popeye is open to attack on both sides and even his beloved spinach can't help him as a steady stream of cans, bottles and pinapples arch down from Olive.

A chain of living turtles form the only route across a river and the native bearer has his work cut out carrying baggages across these unstable stepping stones, in a third game new to the series.

The turtles have a habit of diving for the small black fish which rise constantly from the bottom of the river and if the bearer happens to be standing or jumping to a turtle which is heading down, he'll end up in the drink — baggage and all. Even more frustrating is the fact that his colleague has a habit of disappearing on long tea breaks when he ought to be collecting the baggage from your bearer.

All the credit card-sized games are L.C.D. display, on colourful wide screens and double up as watches complete with an alarm. With a high score feature, two versions on each game and a delightful line in fraught expressions, the games are distributed over here by Woodford-based Computer Games Limited and cost £19.95.



QUESTIONS AND ANSWERS

QUIZ MASTER AND MASTERMIND

You'll have to know your onions with the latest batch of cassettes for the VIC-20.

Quiz Master and Mastermind herald a new series of games for VIC owners with an intellectual bent. Both are being released by Commodore which is keeping up its promise to keep the VIC supplied with software at the rate of two or more tapes or cartridges a week.

The Mastermind cassette costs £9.99 and is available for the VIC with 8K of additional memory. This is a "master" tape and comes with two further cassettes. The first holds a set of general knowledge questions and the second a specialised knowledge subject.

Eight further cassettes can be purchased in this range at £1.99 each. These are made up of four more on general knowledge questions and four more specialist subjects: wine and food, music, sports and games, films and television.

The Quiz Master cassette also costs £9.99 and comes in an A5 box complete with an instruction manual. This tape also requires 8K additional memory and enables you to act as a quiz master, setting questions for friends or relatives to answer. It works on a Mastermind format and can store 120 questions.

These are games with an obvious educational bias, but on a purely educational footing come four VIC cassettes aimed at helping schoolchildren with revision.

The titles presently available are English Language, Modern Maths, Traditional Maths and Biology. They cost £9.99 each.

Both this series and the Mastermind series will be expanded with further titles available before Christmas.

THEY CAME FROM UNDER THE GROUND

MOLE ATTACK

Space Invaders may be pretty mean, dragons usually unsociable but when it comes down to the ultimate in villainy any gardener will tell you the creature he fears most, the mole.

Mole Attack brings the tale of this struggle to life in graphic detail, man against lawn wrecker.

It comes in cartridge form for the VIC-20 and the screen becomes a garden full of moles, while you are represented by a gardener figure complete with vermin-bashing hammer.

You get more points for hammering moles as they just appear above ground and no points at all if you allow the little velvet-skinned creatures to make it all the way to the surface.

The game is available in cartridge form for the VIC from Commodore and costs £19.95. Also out is a Sargon II chess program in cartridge form.

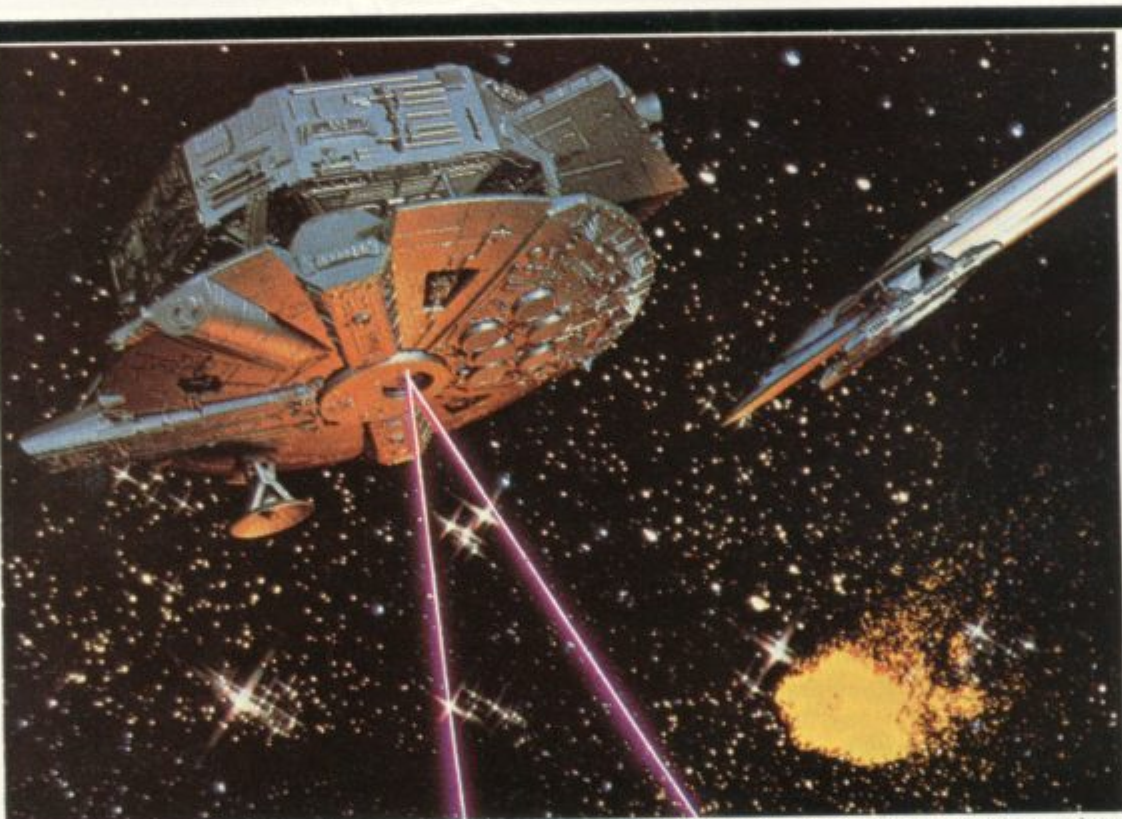
First available for the Apple, Sargon and then Sargon II long stayed at the top of the microcomputer chess tree and plays to a high standard.

Also out at last and costing £24.95, is a series of five famous adventure cartridges, by Scott Adams: Adventureland, Pirate Cove, Mission Impossible, Voodoo Castle and The Count.

Scott Adams is the first lord of Adventure games and all these five have been tried and enjoyed on many other computers since they were first written.

Illustrations: Jon Davis

JOURNEY TO THE STARS, AND BEYOND



STAR VOYAGER

Star Voyager is the name of the Astro Cruiser from whose command bridge you view the galaxy.

It is also the title of the first of the Imagic cartridge range to be available in this country.

The Imagic range is compatible with Atari VCS and initially seven cartridges have been earmarked for release over here before Christmas.

Star Voyager is a good advertisement for the Imagic range. It is brightly packaged and a well-presented eight page instruction booklet sets the scent for the action and explains the controls and even gives some tips on how to play. It is in full colour with five explanatory screen pictures.

The game itself combines two simple computer space game ideas to produce a thoroughly addictive challenge. Your cruiser has been ordered back to the capital starport which is under attack from Zakor.

Space travel in this galaxy is achieved by jumping through star portals — these appear on your screen as flashing squares and seven must be passed through to win home. They give the double benefit of restoring your ship's energy as it passes through — in fact the sound effects and colours were also found to be quite exhilarating by this pilot.

The catch is that each portal is guarded by progressively more Zakoran ships. These flit around the screen firing white missiles at your ship while you desperately try to align your sights — that is the whole of your ship — on them.

If you are used to blasting easy targets like space invaders, Zakoran fighters will give you a nasty shock, fast and manoeuvring to make it difficult for you.

It really is a struggle for the beginner to achieve even one hit before he or she runs out of energy.

You can fire using lasers, a wide effective range, but energy sapping, or photon torpedoes. You can blast the enemy missiles out of the sky as well.

But with lasers taking 11 points from your energy banks — which are only ever replenished to 99 — every shot must count.

The Zakoran missiles take energy from your shields when they hit and when the energy levels are down to zero you are powerless to fire.

Both enemy ships and portals appear on a small radar screen below the main action.

Star portals must be quickly lined between your sights and through you flash.

At the end of your life the game gives you a field promotion for a good display.

My only tip is to suggest you duck under or around the Zakoran fire and then pull them quickly back into the centre of the screen for a snap shot.

But then, I never even made the rank of lieutenant.

The cartridge costs £18.00 and Imagic's range is distributed in this country by Harrogate-based Adam Imports.



Illustrations: Terry Rogers

ALL TEETH AND SMILES

MUNCH AND CRUNCH

Having munched their way through numerous arcades, and microcomputers, those ever greedy Pacman creatures have now muched their way into the Database TV games centre.

This new version of the popular arcade game introduces Munch and Crunch. Crunch is your little man, and Munch is the equivalent of the ghosts in the arcade game. Munch moves through the maze with an ungainly wobbling motion emitting a curious "boing, boing, boing" noise as he chases Crunch.

If he catches him the game offers the picture of Crunch being hastily consumed by Munch to the sound of loud chomping and slurping.

The game for two players which comes on the same cartridge — there are eight versions in all — is a considerable improvement on the usual Pacman.

In this version you take the part of ghosts and Pacman alternately. If you are controlling the Munchies you can move them using your joystick to any area of the maze, drop them there, and they will then move around randomly in pursuit of Crunch until they find him, or until you move them to another part of the maze.

Another interesting variation is that you are given an energy reading which varies according to the amount of food you can consume and which you will also need to get through the exit at the end of the maze.

Munch and Crunch costs £14.95 and is available from Hertfordshire-based Voltmace.

VIDEO SCREEN

WHIRLYBIRDS FLY IN FOR CHRISTMAS



CHOPPER COMMAND

Christmas is coming and the video games centre stockists are busy planning shelf space for the expected rush.

The Atari VCS owners are benefiting from its position as market leader, as a whole host of other companies are bringing out new cartridges for it.

First into this field were Activision and its next offering is Chopper Command, which puts you into a helicopter flying cover for a convoy of medical supplies when your radar panel bleeps out a warning that enemy copters and jets are in the vicinity.

The Imagic range has another five cartridges coming before January and toy company Palitoy is next into this field with a range of Parker Brothers titles coming from the U.S.

These include a number of licensed copies of popular arcade games and other games which feature characters or a scenario from cult films. Seven cartridges have already been earmarked for release over here.

There's also a new cheaper TV games centre coming onto the market in time for Christmas. The Innovator sells for £69 with a free game cartridge and 22 games ready to choose from.

It is being distributed in Britain by a new name in the electronic toy market, Leisure Zone, which promises a rapidly expanding catalogue of cartridges.

Among the initial 22 are Combat, Nibbleman, Alien Invader, Golf, Othello, Chess, Phoenix, Berserk, Defender and Missile War.

IT'S RIGHT ON CUE

TRICK SHOT

Hurricane Higgins would have to slow down his style if he was to succeed at Trick Shot.

This second Imagic cartridge, to be released in September, offers billiards, an unusual version of pool and a long list of trick shot challenges to master.

The screen shows a green baize table complete with overlarge balls and pockets.

When a player comes to take a shot he lines up a small dot, which represents his cue tip, behind the cue ball. When satisfied that he has positioned it well-enough to make the desired angle, he hits the fire button.

A quick tap on the button will give a weak trickling shot to down those balls hanging over a pocket. But for the Hurricane Higgins specials, around four cushions and almost off the table, the button must be depressed for a longer period before being released.

Five seconds is the maximum power shot possible. A 16 page instruction booklet describes these rules and possibilitites thoroughly.

"English" appears to be the US slang for putting spin on a billiard or pool shot. English is achieved by pushing the joystick in the direction you want the ball to spin. The maximum spin results from a seven second push. When the cue ball strikes another ball or the "cush" it spins in the direction dictated.

Trick shot games line balls up in a set pattern and challenge you to pot them all.

Pool is made up of five racks of three balls each and like English Billiards, is for two players.

Convincing ball movement is achieved by use of a shadow on the balls but the large pockets make it perhaps too easy for miss-hit shots to count.

Trick Shot is for the Atari VCS and costs £20.00 from Adam Imports.

COSMIC CLASSIC

STARMASTER

Activision have won the race to produce an Atari VCS version of the classic Star Raiders game.

Star Raiders first appeared on the Atari 400 and 800 home computers and was thought by many to be the state-of-the-art in computer games.

It is a real-time Startrek game which places the player in the cockpit and allows him to engage the Klingon creatures in a deadly space battle in space above planets and space stations.

Atari themselves have a Star Raiders cartridge due out later this year and the Imagic Star Voyager game (opposite page) is similar though not quite as close a copy.

The screen shows a view from a spacecraft cockpit, complete with an on-board computer display, monitoring energy levels, stardates and ship damage.

Alien fighters and meteor showers block the path through space to the four motherships, which must be preserved from alien attack. Any hits from the fighters will buckle the shields and gradually help to cripple the starship. Meteors can either be dodged or blown out of the way.

Only repairs on a Mothership will enable the starship to become fully functional again but first it must manoeuvre to dock with her.

This game also features cross sights in the centre of the screen. These are fixed in the centre and the whole screen is moved in response to joystick tugging.

This represents the craft moving rather than the guns swivelling as these are supposedly fixed to the wings of the fighter.

The cartridge costs £24.95 and should have already found its way into your Atari cartridge stockists.

MORE MAD METAL MEN

BERSERK

The robots have gone Berserk in this new game for the Atari VCS console.
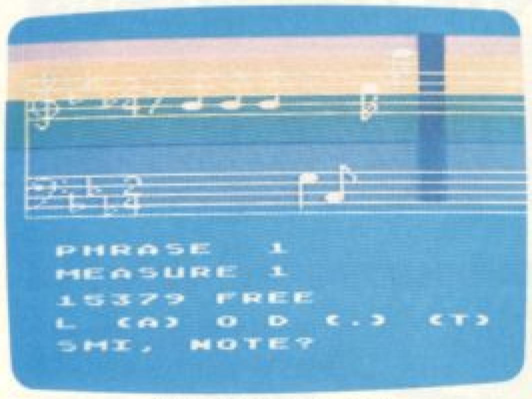
In Berserk you are represented by a small figure on the screen which is faced by rooms full of aggressive robots.

You are armed with a gun which fires only in the direction you are moving and the robots are blasting away too.

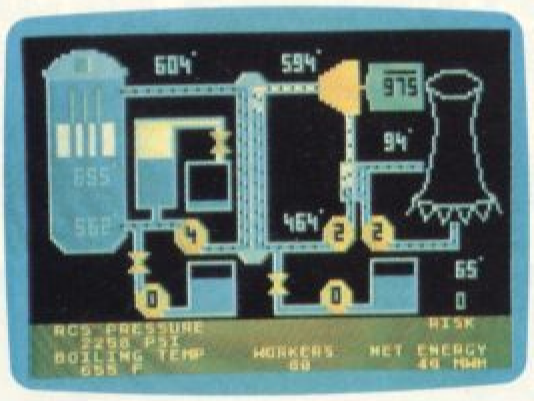
The secret of good Berserk players' success is to judge when discretion becomes the better part of valour and he should make a break for the exit.

This time usually coincides with the appearance of the third character on the game scene. This is Evil Otto, who looks deceptively pleasant.

The game is the latest in the Atari catalogue and makes the transformation from the arcades to the home screen with no noticeable compromises. There are nine variations on the cartridge which costs £29.95.



Music Composer



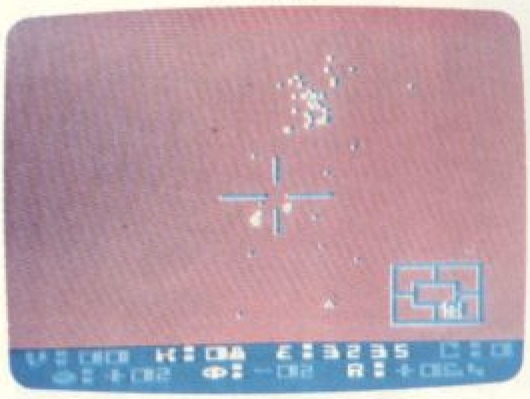
Scram



Graph-it



Intro to BASIC 1



Star Raiders



European Countries



Missile Command



Basketball

3.7 million reasons why the Atari Home Computer is something to see. The display screen used with our computers is composed of 192 horizontal lines, each containing 320 dots. Delivering colour and luminosity instructions to each dot for a second requires 3.7 million cycles...a lot of work for the normal 6502 processor.

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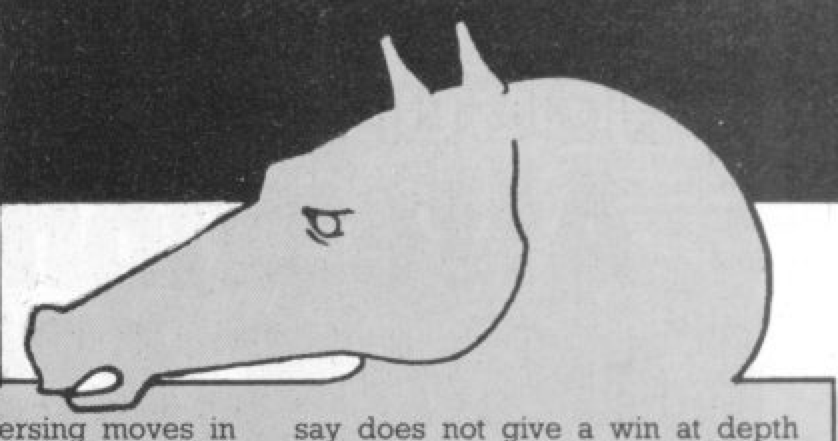
CVG2

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CHESS



The endgame is a notoriously difficult task for the chess programmer. "Brute force" chess programs relying mainly on analysis, usually play endgames very badly. However there is a trick which enables some endgames — those with a small number of pieces — to be analysed out completely. This method, which was pioneered by Michael Clarke, a researcher at London University, is based on working backwards progressively from "terminal" positions where the weaker side is checkmated.

The analytic power which can make the best programs extremely dangerous opponents in the middle game is hopelessly weak for endgame play.

As an example, figure one shows an apparently innocuous position in the King and Pawn against King endgame. White's only winning move is K-QB2.

Whatever Black replies White can now eventually promote his Pawn and thus win, but to demonstrate this involves an analysis of no fewer than 27 ply ahead (14 White moves and 13 Black)!

The strong player does not even attempt such analysis. He simply recognises figure one as an example of a class of positions in which White needs to play his King to the far side of the Pawn and selects the right move immediately.

I will illustrate Michael Clarke's method using the endgame King and Rook against King, assuming that White is the side with the Rook.

Figure two is a terminal position — referred to as a win for White at depth zero.

It is obviously possible to write a list of all such positions — or generate it by computer.

Now, for each such position in turn, retract all possible legal last moves for White.

In figure two, White has seven legal "reverse moves", i.e. he may just have moved his Rook from R1, R2, R3, R4, R5, R6 or R7.

All these positions are forced wins for White in one ply (all White to move of course), of which one is shown in figure three. Finding wins in one ply by reversing moves in this way is known as "backing up".

A complication occurs in trying to back up a further stage to positions which are lost for Black in 2 ply. Retracting a Black move from figure three gives two possibilities, the King may have previously been on QR1 (figure four) or on QB1 (figure five).

The former is a loss in 2 ply but the latter is not (Black to move does not need to commit suicide by moving to QN1, he can escape for a while by playing to Q1 or Q2).

To distinguish between these two cases, a counter is set up initially for every Black to move position of the number of legal Black moves. Whenever a position is generated by reversing a Black move, its counter is reduced by one.

Thus, for figure four, the count is initially one; subtracting one gives zero — indicating that the position is lost — in this case at two ply.

However, for figure five, the count is initially three; subtracting one gives two — indicating that there are two legal "antecedents" (with King on Q1 and Q2) not yet shown to be losses.

Figure four is included in the collection of losses at depth two ply, and the algorithm proceeds by now reversing all legal White moves to reach that position.

Reversing a Rook move from R2 say does not give a win at depth three (since that position is already included in the set of depth one wins), but reversing a King move from QR5 does (figure six).

The method continues in this way treating White to move and Black to move cases separately.

When retracting a Black move, simply reduce the "legal moves not yet shown to lose" counter of each resulting position by one and include a position as lost only when the counter becomes zero.

When eventually a level is reached from which no new positions are discovered to be won by backing-up, the process terminates and any remaining legal positions are not won for White (e.g. because the Rook is *en prise* to the Black King).

As an indication of what is involved, a four piece endgame has 16 million possible positions with each side to move and adding each additional piece multiplies this by 64.

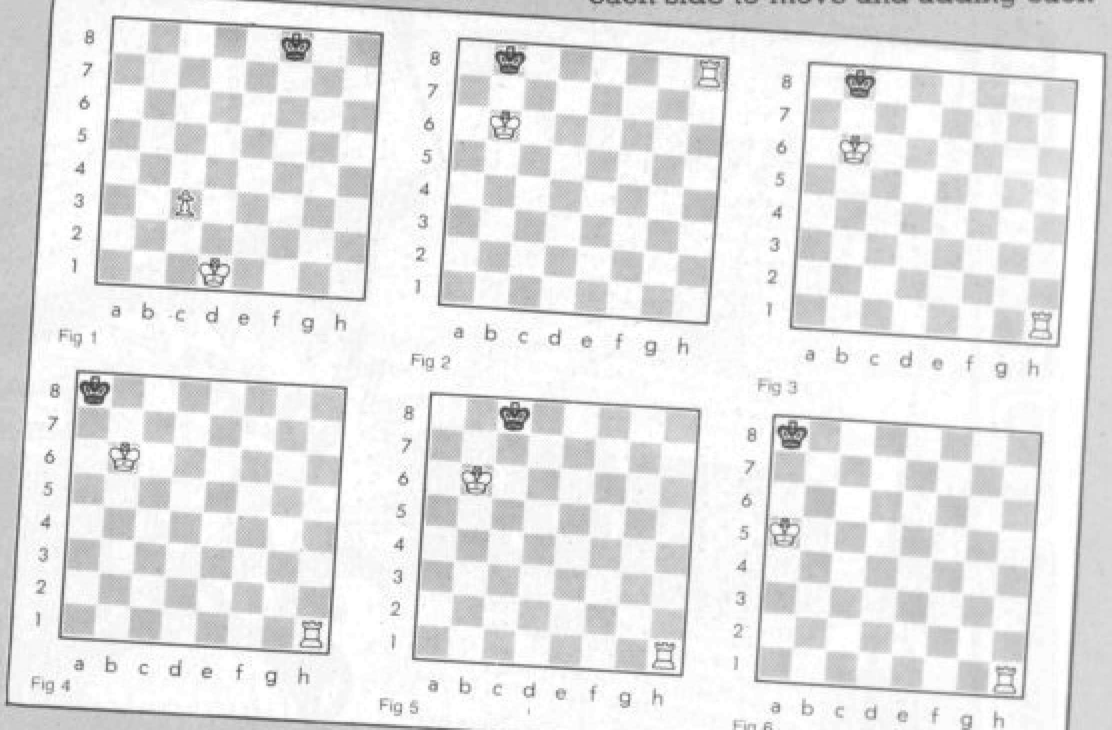


Fig 1 Fig 2 Fig 3 Fig 4 Fig 5 Fig 6

This number can be reduced by taking advantage of symmetry, but even so it is not likely that endgames with more than five pieces will ever be solved in this way.

However, the potential "targets" include a number of interesting endgames, particularly the classic endgame of King, Rook and Pawn against King and Rook.

BY MAX BRAMER



MAL FUNCTION
T. HITCH
SNAG JNR
SCREAMING FOUL UP
CONTROL ROOM MONITOR
THE BUGS
GAME OF LIFE GENER
IT'S A TERRIBLY CRUEL GAME THIS LIFE - JOHN CONWAY HAS A LOT TO ANSWER FOR.
GAME OF LIFE
ALL THOSE LITTLE CELLS OUT THERE... DYING OF LONELINESS IF THEY'RE LEFT ALONE ON THE SCREEN AND BEING STARVED OF SPACE IF THERE ARE MORE THAN THREE NEIGHBOURS.
I'VE DONE IT. A LITTLE LOOP HERE AND A CHANGE OF VARIABLE THERE AND I'VE SAVED THE DYING LIFE CELLS BY PULLING THEM OFF THE SCREEN JUST BEFORE THE NEXT GENERATION IS PLANNED!
SO WHAT WILL HAPPEN TO THEM?
THEY'LL TURN UP.. ER!....... IN THE MEMORY ROOM I SUPPOSE
IN THE MEMORY ROOM.
ZZZZZZZZZ
MEMORY BIN
MEMORY BIN
HUH!
PLOP!
..AND THEN I STARTED TO FEEL REALLY LONELY..!!
MEMORY ROOM
SCRIBBLE! JOT!

Warning: This program may damage your health!

Fancy some explosive entertainment? Then program in this listing. It explores one of the mysteries of the universe — antimatter. DAVID LANGFORD braves the dangers and brings you a rundown on how to make space travel with your micro more realistic.

You are invited on a deadly mission to the heart of the asteroid belt . . .

SF buffs will be well aware of the perils of antimatter, that stuff whose atoms consist of positively charged anti-electrons circling nuclei of negatively charged anti-protons. In tiny quantities it's an interesting scientific curiosity; a large piece would be sudden death.

When matter meets antimatter they annihilate one another, converting mass to energy with near 100 percent efficiency — as compared to 0·5 percent maximum efficiency in a hydrogen bomb.

One kilogram of matter plus one kilogram of antimatter would annihilate with the explosive force of nearly 43 million tons of TNT.

Naturally such lethal stuff would have uses in weaponry and power plants, and if it could be found floating free in space, people would soon be taking risks to "mine" it. The classic approach is found in Jack Williamson's SF novel *Seetee Ship*. With little electromagnetic coils you entice meteoroids of anti-iron towards you and tow them through space — making sure they never get too close!

```
10 ' ANTIMATTER METEOR CAPTURE
20 ' COPYRIGHT (c) DAVID LANGFORD 1982
30 '
100 'SET UP VARIABLES
110 DEFINTI-M
120 K=20000 ' MAGNETIC COIL FUDGE FACTOR
130 DT=3 ' TIME STEP
140 YM=43
150 YF=44
160 YZ=47
500 ' INITIALIZE DISASTER ROUTINE
510 DATA 33,0,60,54,191,17,1,60,1,255,3,237,176,201
520 X$="" ' THIS STRING WILL HOLD MACHINE CODE FOR WHITEOUT
530 FORI=1TO14
540 READJ
550 X$=X$+CHR$(J)
560 NEXTI
1000 ' INSTRUCTIONS / DIFFICULTY LEVEL
1010 CLS
1020 PRINT@277,"#### ANTIMATTER ####"
1030 PRINT
1040 PRINT
1050 PRINT"USE YOUR SPACECRAFT'S MAGNETIC FIELD COILS TO GUIDE A METEOROID
1060 PRINT"OF ANTIMATTER-IRON SAFE INTO THE CARGO HATCH; IF IT TOUCHES THE
1070 PRINT"HULL OR AN OPERATING MAGNETIC COIL, BEWARE!
1080 PRINT
1090 PRINT"THE COILS ARE NUMBERED 1-9 AND ARE ACTIVATED BY THOSE KEYS; THE
1100 PRINT"WIDER THE CARGO HATCH, THE FEWER COILS ARE AVAILABLE. USE THE
1110 PRINT"ZERO KEY TO DEACTIVATE COILS IF NEEDED.
1120 PRINT
2000 INPUT"SET DIFFICULTY LEVEL (0-20) ";ID
2010 ' SET UP SCREEN AND RANDOMIZE METEOROID POSITION
2020 CLS
2030 PRINT@962,"";
2040 FORI=1TO9 ' WRITE COIL NUMBERS
2050 PRINTI;
2060 IFI<>9THENPRINT"     ";
2070 NEXTI
2080 FORI=0TO42+ID ' DRAW 'HULL' WITH 'CARGO HATCH'
2090 SET(I,44)
2100 SET(127-I,44)
2110 NEXTI
2120 FORI=43+IDTO84-ID ' ERASE NUMBERS UNDER 'HATCH'
2130 RESET(I,45)
2140 NEXTI
2150 X=RND(128)-1 ' RANDOMIZE HORIZONTAL POSITION
2160 Y=RND(15)-1 ' RANDOMIZE VERTICAL POSITION
2170 SET(X,Y) ' DRAW METEOROID
2180 VX=RND(0)/2 ' RANDOMIZE HORIZONTAL VELOCITY
2190 IFX>63THENVX=-VX ' REVERSE IF NEARER RIGHTHAND EDGE
2200 VY=0 ' ZERO VERTICAL VELOCITY
2210 IM=0 ' NO MAGNETIC COILS OPERATING
3000 ' MAGNETIC COIL CONTROL
3010 A$=INKEY$ ' LOOK FOR COIL CONTROL INSTRUCTION
3020 IFA$=""THEN4000
3030 IM=VAL(A$) ' CONVERT TO NUMBER OF COIL
3040 RESET(XM,YM) ' BLANK OUT OLD COIL
3050 IFIM=0GOTO4000
3060 XM=14*IM-7
3070 IFPOINT(XM,44)<>0THENSET(XM,43)ELSEIM=0 ' SHOW CURRENT COIL
4000 ' EQUATIONS OF MAGNETIC FIELD AND MOTION
4010 IFIM=0THEN4100
4020 DX=X-XM ' HORIZONTAL DISTANCE, METEOROID TO COIL
4030 DY=Y-YM ' VERTICAL DISTANCE
4040 Z2=DX*DX+DY*DY ' STRAIGHT-LINE DISTANCE (Pythagoras)
4050 Z1=Z2+1
4060 FZ=K*SQR(Z2)/(Z1*Z1*SQR(Z1)) ' MAGNETOSTATIC EQUATION
4070 TH=ATN(DX/DY) ' ANGLE OF MAGNETIC PULL
4080 VX=VX+FZ*SIN(TH)*DT ' NEW HORIZONTAL VELOCITY
4090 VY=VY+FZ*COS(TH)*DT ' NEW VERTICAL VELOCITY
4100 ' MOTION
4110 XX=X
4120 YY=Y
4130 X=X+VX*DT ' NEW HORIZONTAL POSITION
4140 Y=Y+VY*DT ' NEW VERTICAL POSITION
4150 IFINT(XX)=INT(X)ANDINT(YY)=INT(Y)THEN3000
4160 IFY>YZTHEN5000' CHECK OVERSHOOT
4170 IFX<0ORX>127THEN8000' CHECK ESCAPE OFFSCREEN
4180 IFPOINT(X,Y)<>0THEN6000' CHECK FOR HULL IMPACT
4190 RESET(XX,YY) ' ERASE OLD POSITION
4200 SET(X,Y) ' DRAW NEW POSITION
4210 IFY<YFTHEN3000
4220 IFY<45THEN7000
5000 ' OVERSHOOT CALCULATIONS
5010 XF=XX+(X-XX)*(YF-YY)/(Y-YY) ' WHERE DID IT INTERSECT HULL?
5020 IFPOINT(XF,YF)=0THEN7000' OK IF IN CARGO HATCH
6000 ' DISASTER! WHITE OUT SCREEN
6010 POKE16526,PEEK(VARPTR(X$)+1)
6020 POKE16527,PEEK(VARPTR(X$)+2)
6030 I=USR(I) ' WHITEOUT
6040 FORI=1TO100 ' ADDITIONAL FANCY TOUCHES
6050 POKE15359+RND(1024),128+RND(62)
6060 NEXT
6070 GOTO1000
7000 ' VICTORY!
7010 PRINT@128,"CONGRATULATIONS! YOU HAVE STEERED AN ANTIMATTER METEOROID
7020 PRINT"SAFELY INTO YOUR CARGO HOLD AT DIFFICULTY LEVEL";ID
7030 FORI=1TO1500 ' TIME DELAY
7040 NEXTI
7050 PRINT@64,""
7060 PRINT
7070 PRINT
7080 IFY<=YZTHENRESET(X,Y)
7090 GOTO8070
8000 ' METEOROID ESCAPED OFFSCREEN: INDICATE AND RESTART
8010 FORI=1TO30
8020 PRINT@345,"M I S S E D !"
8030 FORJ=1TO30
8040 NEXTJ
8050 PRINT@345,"              "
8060 NEXTI
8070 RESET(XX,YY) ' ERASE OLD METEOROID
8080 RESET(XM,YM) ' CLEAR MAGNETIC COIL
8090 GOTO2150
```



Illustration: Terry Rogers.

Antimatter: In tiny quantities it's interesting — larger amounts can cause a few problems

This could be the basis of many nerve-racking computer games. My sample program printed here gives a fairly simple version. As usual in this column, it's not offered as a perfect and polished game but as something to set you thinking about *your* version. So although the listing is for a TRS-80, the idea is transplantable to any machine.

In this version, meteoroids appear and move with random speed across the screen. At the bottom, a solid white line represents the hull of your spacecraft — if the antimatter meteoroid should even touch it, multi-megaton disaster follows.

In the hull is a cargo hatch — whose width depends on the "difficulty level" chosen — and beneath are numbers corresponding to the positions of your electromagnets. Pressing one of the keys 1 to 9 causes the appropriate magnetic coil to be turned on — only one can be used at a time — and pressing the zero key turns it off. If the meteoroid can be guided into the hatch, then automatic magnetic fields will store it safely.

What's interesting is that these electromagnets don't operate, as you might think, by the inverse-square law — meaning that the pull drops by a factor of four when the meteoroid is twice as far away. It's more like inverse-fourth-power, with the magnetic pull dropping by a factor of about 16 when the distance is doubled.

This makes it deadly dangerous to try last-minute course corrections if the meteoroid is near the relevant electromagnet — it'll dive-bomb it at once thanks to the huge pull at close range. My approximation of the magnetostatic equation is spread through lines 4040-4060; all the boring factors like current and number of windings in the electromagnet are bundled together as K in line 120. Make K bigger and your magnets are proportionally more powerful.

If you prefer your meteoroids to be sitting ducks, omit line 2180; if you fancy a little more aggro from them, try changing line 2200 to VY=RND(0)/3.

The sample program doesn't contain much else that's abstruse. The machine-code whiteout is straight from the Tandy manual. There's a bit of elementary trigonometry in lines 4070-4090, splitting up the magnetic pull into horizontal and vertical components so as to make a crude calculation of the changes in the meteoroid's horizontal and vertical velocity; lines 4130-4140 are equally crude about its changing position in space.

You know all you need to know about this meteoroid when you know four variables: horizontal and vertical position, horizontal and vertical velocity. Another couple of variables and you could track it in *three* dimensions . . . but the display would be a problem!

Once again, you are challenged to improve on this rough program. Could it be made faster and more difficult? How about inserting a scoring system — perhaps like baseball, allowing you to ignore a certain number of meteoroids which seem too high or fast to be captured safely? What if the electromagnets could be switched to *repel*? Impossible: but this is science *fiction*! Or if the program dealt with more than one meteoroid at a time?

Give it a try; let your imagination run riot; and let's hope all those multi-megaton antimatter explosions won't be injurious to the health.

Read this ad

<u>You</u>: "Darling, I've decided to buy a computer."

<u>Her</u>: "***++**??!!***@XX??££**??!!? off!"

<u>You</u>: "Yes, I know we could do with a new washing machine. But the new Dragon 32 Computer is much more important. It's the first computer actually designed for all the family - and it costs under £200!"

<u>Her</u>: "***++??!!@££??! fortune!"

<u>You</u>: "No, I'm not being selfish. Computers are for the whole family - and they're going to play a big part in the children's future."

<u>Her</u>: "Oh?"

From this point on, the conversation should follow more reasonable lines. Allowing you to fully explain the many advantages of the new Dragon 32 family computer.

<u>32K RAM FOR UNDER £200*</u>

For a start, the Dragon offers 32K RAM. Your wife may not understand that, so just tell her that the Dragon's capabilities are truly massive - at least twice as powerful as its competitors, with some features you won't find even in more expensive units. The Dragon will give you all the power you're likely to need, and more, to create your own programs - along with an exciting range of software which can do anything from helping with kids' spelling and arithmetic to creating your own cartoons.

<u>THE FIRST FAMILY COMPUTER.</u>

All of which brings you nicely to the point where you tell your wife just how much fun the kids will have with the Dragon. How it will save her all that



*Television not included in price.

money on those Space Invader machines. How it will magically translate simple typed instructions into beautiful drawings and designs using set, line, circle, draw, scale, rotate and paint features, in up to 9 colours - and play and compose

to your wife.

SPECIFICATIONS
6809E MICROPROCESSOR. Pet, Apple, Atari 400, BBC Micro, and VIC 20 still have the less powerful 6502.
32K RAM (as standard). At least twice the power of similarly priced machines. Expandable to 64K RAM.
EXTENDED MICROSOFT COLOUR BASIC (as standard). Featuring: ADVANCED GRAPHICS (set, line, circle, paint, print, draw, rotate and print using). ADVANCED SOUND 5 octaves, 255 tones. AUTOMATIC CASSETTE RECORDER CONTROL. FULL EDITING with INSERT and DELETE.
9 COLOUR, 5 RESOLUTION DISPLAY.
USE WITH ANY U.H.F. TV and/or separate P.A.L. monitor.
PROFESSIONAL QUALITY KEYBOARD. Typewriter feel. Guaranteed for 20 million depressions.
PRINTER (Centronics parallel).
JOYSTICK CONTROL PORTS.

with 5 octaves of music. How it will engross your children in mind-boggling adventures in dungeons and caves without even getting their knees dirty. And the Dragon works with any U.H.F. TV.



THEY'LL LEARN AS THEY PLAY.

And then you can casually point out that although the kids are having fun, they're also learning. And within a very short space of time, the whole family will be completely at home with programming - with computer language - with every aspect of how computers work. Which can't do their future prospects any harm at all.

BRILLIANTLY SIMPLE INSTRUCTION MANUAL.

The Dragon is made in Britain, designed with the help of British Universities. And it's also worth remembering that the Dragon's instruction manual is clearer and easier to understand than any other home computer's.



That its top-quality keyboard is as easy to use as a typewriter, and so well made it's guaranteed for twenty million depressions.

TAKE THE FAMILY DOWN THE HIGH STREET.

And if she still wants to know more, take her to see the Dragon 32. It'll soon be available in most good stores - or you can send the coupon for further details.

And if you're one of our many lady readers, please accept our apologies.

Perhaps you'd like to read this ad to your husband.

DRAGON 32

The first family computer.

To: Jean Webster, Dragon Data Ltd., Queensway, Swansea Industrial Estate, Swansea, Glamorgan SA5 4EH.
Tel: 0792 580651.

Please send me further information about the Dragon 32.

Name ____________________

Address ____________________

____

____

____________________ CV

A member of the Mettoy Group of Companies.

STAR WAR

The rebel ship hurtles through space in a desperate race for life. Behind the already damaged ship an Empire starfighter stalks its victim.

The rebel space captain is seeking the sanctuary of the ringed planet Zargon. Once in orbit the rebel ship will be safe from the Empire fighters' laser blasts. One added complication is that the rebels have run into a fierce meteor storm which threatens to destroy their damaged craft.

Can you help steer the crippled ship through the storm to safety? All you have to do is blast the meteors with your laser cannon — using the shift and repeat keys.

Ten hits by meteors on the rebel ship will prove fatal. May the Force be with you!

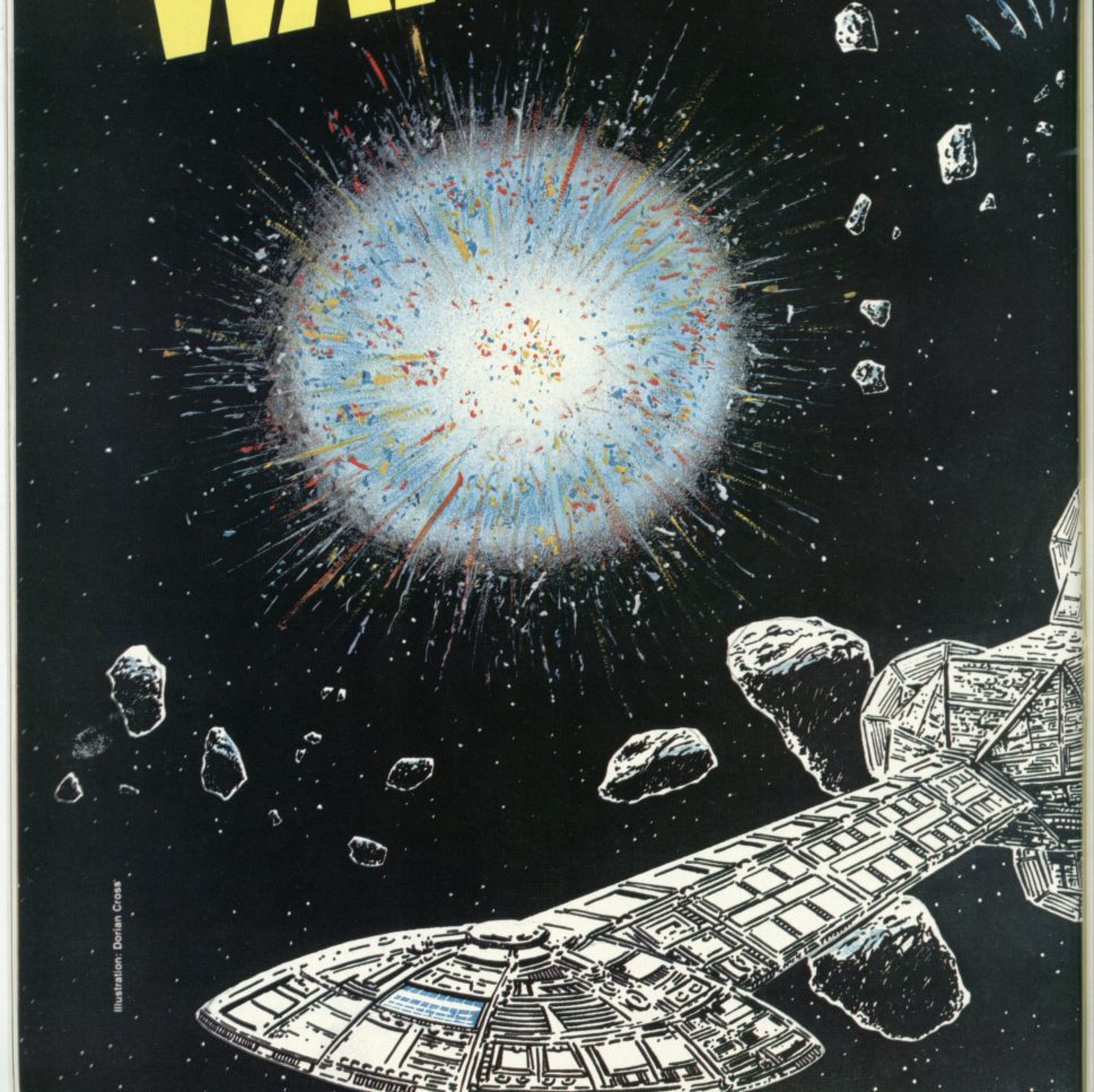
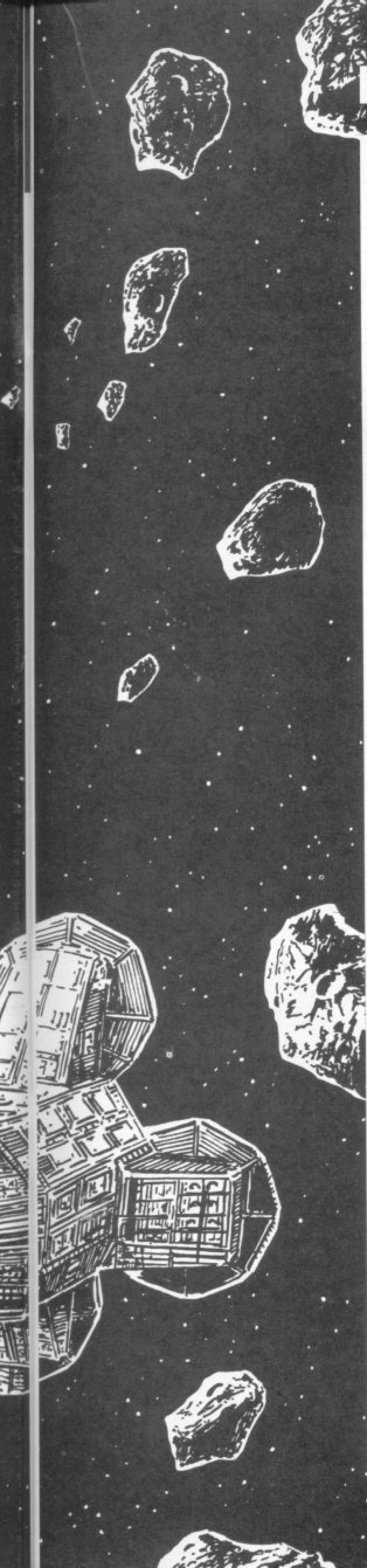


Illustration: Dorian Cross



RUNS ON AN ACORN ATOM BY J. C. FLOWER

```
 5 REM  star war  c1982 J FLOWER.
 7 GOTOt
10vA=ABSRND%(128);B=ABSRND%(96-10)+10;F=ABSRND%(10);E=0
12 G=57;H=1;I=5;Y=0;W=0
14 CLEAR2
16 FORS=1 TO140;PLOT13,(ABSRND%(128)),(ABSRND%(96));NEXT S
18iQ=13;GOSUBk;GOSUBn
20 N=13;GOSUBg;GOSUBf;GOSUBj;N=15;GOSUBg
22  N=13;GOSUBe;GOSUBj;GOSUBn
24 GOSUBj;Q=15;GOSUBk;GOSUBl;Q=13;GOSUBk;GOSUBn
26 N=15;GOSUBf;N=13;GOSUBd;GOSUBj;N=15;GOSUBe;N=13;GOSUBc
28 GOSUBj;Q=15;GOSUBk;GOSUBl;Q=13;GOSUBk;GOSUBn
30 GOSUBj;N=15;GOSUBd;N=13;GOSUBb;GOSUBj
32 GOSUBj;GOSUBn
34 N=15;GOSUBc;N=13;GOSUBa;GOSUBj
36 GOSUBj;GOSUBn
38 N=15;GOSUBb;N=13;GOSUBh;GOSUBj;N=15;GOSUBa;GOSUBh
40 Q=15;GOSUBk;GOSUBl
42 GOTOi
44aPLOTN,59,59;PLOTN,63,61;PLOTN,67,61;PLOTN,71,58
46 PLOTN,71,55;PLOTN,70,51;PLOTN,67,50;PLOTN,60,51;R.
48bPLOTN,53,63;PLOTN,59,68;PLOTN,69,69;PLOTN,77,63
50 PLOTN,79,56;PLOTN,76,46;PLOTN,71,42;PLOTN,54,45
52 PLOTN,51,53;R.
54cPLOTN,44,68;PLOTN,55,77;PLOTN,70,80;PLOTN,86,68
56 PLOTN,90,57;PLOTN,84,38;PLOTN,76,32;PLOTN,46,39
58 PLOTN,40,52;R.
60dPLOTN,35,74;PLOTN,50,87;PLOTN,71,89;PLOTN,95,73
62 PLOTN,100,57;PLOTN,91,32;PLOTN,80,23;PLOTN,39,32
64 PLOTN,30,52;R.
66ePLOTN,26,80;PLOTN,103,79;PLOTN,110,69;PLOTN,99,26
68 PLOTN,84,14;PLOTN,31,26;PLOTN,20,50;R.
70fPLOTN,18,85;PLOTN,112,85;PLOTN,121,60;PLOTN,107,19
72 PLOTN,88,5;PLOTN,23,18;PLOTN,10,50;R.
74gPLOTN,10,90;PLOTN,120,90;PLOTN,113,13;PLOTN,16,13;R.
76hPLOTN,65,55;R.
78jFORX=1TO2 ;WAIT;NEXTX;R.
80kPLOT Q,A,B;PLOT Q,A,(B+1);PLOT Q,A,(B+2);PLOT Q,A,(B+3)
82 PLOT Q,A,(B+4);PLOT Q,A,(B+5);PLOT Q,A,(B+6)
84 PLOT Q,A,(B+7);PLOT Q,(A+1),(B+3);PLOT Q,(A+2),(B+2)
86 PLOT Q,(A+2),(B+3);PLOT Q,(A+2),(B+4)
88 PLOT Q,(A+3),(B+1);PLOT Q,(A+3),(B+2);PLOT Q,(A+3),(B+4)
90 PLOT Q,(A+3),(B+5);PLOT Q,(A+4),(B+1);PLOT Q,(A+4),(B+2)
92 PLOT Q,(A+4),(B+4);PLOT Q,(A+4),(B+5)
94 PLOT Q,(A+5),(B+2);PLOT Q,(A+5),(B+3);PLOT Q,(A+5),(B+4)
96 PLOT Q,(A+6),(B+3)
98 PLOT Q,(A+7),B;PLOT Q,(A+7),(B+1);PLOT Q,(A+7),(B+2)
100 PLOT Q,(A+7),(B+3);PLOT Q,(A+7),(B+4);PLOT Q,(A+7),(B+5)
102 PLOT Q,(A+7),(B+6);PLOT Q,(A+7),(B+7)
104 E=E+1;IFE>F AND Q=13 THEN GOSUBm
106 R.
108lIF A<55 THEN A=A+3
110 IF A>65 THEN A=A-3
112 IF B<35 THEN B=B+4
114 IF B>45 THEN B=B-4
116 IF A>=55AND A<=65 THEN A=ABSRND%(128)
118 IF B>=35AND B<=45 THEN B=ABSRND%(96-10)+10
120 R.
122mMOVE(A+3),B;DRAW(A+3),0;WAIT;WAIT;WAIT
124 IF(A+3)>G AND(A+3)<(G+8) THEN P.$7;Y=Y+1
126 WAIT;WAIT;PLOT7,(A+3),B;WAIT;WAIT
128 F=ABSRND%(10);E=0
130 R.
132nT=?#B002;T=T!#BF;IFT=#BFTHENI=7;GOSUBo;G=G+3;I=5
134 T=?#B001;IFT=#7FTHENI=7;GOSUBo;G=G-3;I=5
136 IFT=#FF THEN I=5
138 IFG>=120THEN G=1
140 IF G<=0 THEN G=120
142oMOVEG,(H+1);PLOTI,G,H;PLOTI,(G+8),H;PLOTI,(G+8),(H+1)
144 MOVE(G+4),(H+1);PLOTI,(G+4),(H+4)
146 IFY=10THENFORN=#8000TO#9000STEP4;!N=-1;NEXTN;CLEAR0
148 IFY=10THENP.$30;P."YOU HAVE BEEN VAPORISED"''';GOTOx
```

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```
150 T=?#B001;IFT=#BF THEN GOTOq
152 RETURN
154qPLOT5,(G+4),(H+60)
156 MOVE(G+4),(H+4);WAIT;WAIT;PLOT7,(G+4),(H+60)
158 IF(G+4)>A AND (G+4)<(A+7) AND (H+60)>B THENP.$7;W=W+1
160 IF W=40 THEN GOTOu
162 R.
164xP."YOU SCORED "W" HITS"'
166 P."YOU NEEDED 40 TO WIN"';END
168sCLEAR0;P.$30;P."******BATTLE COMPUTER******"'''
170 P."THE STARFIGHTER IS DESTROYED"'''
172 P."YOU ARE LEAVING HYPERSPACE"'
174 P."IN ORBIT AROUND ZARGON"'
176 FORN=1 TO 300;WAIT;NEXTN
177 A=#80;!A=#022D80A9;A!4=#4CF9D0B0;CLEAR2
178 A!8=!#3FE;!#3FE=A
180 X=64;Y=48;MOVEX,Y
182 R=20;G=0;H=0
184 FORZ=0TO128STEP2
186 %T=Z/20
188 %Q=X+(R*COS%T)
190 %S=Y+(R*SIN%T)
192 PLOT5,%Q,%S
194 PLOT5,X,Y
196 NEXTZ
198 G=0
200 FORZ=0TO128 STEP2
202 %T=Z/20
204 R=50
206 GOSUBp
208 IFG=0THENGOSUBr
210 PLOT5,%Q,%S
212 R=30
214 GOSUBp
216 PLOT5,%Q,%S
218 NEXTZ
220 FORE=1TO40;X=ABSRND%(128);
Y=ABSRND%(96);PLOT13,X,Y;NEXT
222 END
224rMOVE%Q,%S;G=1;R.
226p%Q=X+(R*COS%T)
228 %S=Y+(R*SIN%T)/5;R.
                    star"$128"war"'
229tP.$12"
230 P."YOU ARE IN COMMAND OF A REBEL"'
232 P."CRUISER BEING PERSUED BY AN"'
234 P."EMPIRE STAR FIGHTER THROUGH A"'
236 P."METEOR STORM."'
238 P."YOUR SHIP IS ALREADY DAMAGED."'
240 P."STEER YOUR LASER CANNON USING"'
242 P." THE SHIFT AND REPT. KEYS AND "'
244 P."FIRE USING CONTROL."'
246 P."TEN HITS DESTROY YOU."'
248 P."YOU MUST ACHIEVE SAFE ORBIT"'
250 P."ROUND THE RINGED PLANET ZARGON."'
252 P."MAY THE FORCE BE WITH YOU."'
254 P."HIT SHIFT"
256wV=?#B001
258 IFV=#7F THEN GOTOv
260 GOTOw
262 END
264uX=A+3;Y=B+4
266 FORP=0TO30STEP1
268 T=A.R.%(120);%T=RAD T
270 %U=%T+RAD(120);%V=%U+RAD(120)
272 %Q=X+(P*COS%T)
274 %R=Y+(P*SIN%T)
276 %S=X+(P*COS%U)
278 %T=Y+(P*SIN%U)
280 %A=X+(P*COS%V)
282 %B=Y+(P*SIN%V)
284 MOVE%Q,%R
286 DRAW%S,%T;DRAW%A,%B;DRAW%Q,%R
288 NEXTP;GOTOs
```

Col

RUNS ON A TRS-80 LEVEL 1&2

```
0 REM ESCAPE FROM COLDITZ GAME ( COPYRIGHT S.WILKINSON 6/1981 )
5 CLEAR1000
10 CLEAR750:CLS:PRINT:PRINT
15 PRINTSTRING$(50," ");CHR$(186);CHR$(144);"          ";CHR$(168)
20 PRINT"  >>  ESCAPE  FROM  C O L D I T Z  <<          ";CHR$(170)
;CHR$(160);CHR$(176);CHR$(188);CHR$(176);CHR$(186);CHR$(187);CHR
$(187);"  ";CHR$(190);" ";STRING$(2,176);CHR$(168);CHR$(175);CHR
$(173);"   ";
30 PRINTSTRING$(43," ");CHR$(160);STRING$(2,190);CHR$(191);CHR$(
187);CHR$(191);STRING$(3,190);CHR$(188);STRING$(3,191);CHR$(173)
;STRING$(5,159);CHR$(148)
40 PRINT"   = A  TRS-80  ADVENTURE  GAME =              ";CHR$(186);
CHR$(157);CHR$(191);CHR$(174);CHR$(157);CHR$(191);CHR$(174);CHR$
(189);CHR$(191);CHR$(190);CHR$(189);STRING$(2,191);STRING$(5,187
);CHR$(183);CHR$(149)
50 PRINTSTRING$(42," ");CHR$(144);STRING$(19,191);STRING$(2,189)
;
60 PRINT"    * BY STUART WILKINSON *               ";CHR$(160);CHR$
(168);STRING$(23,191);
70 PRINTSTRING$(36," ");CHR$(144);" ";CHR$(176);STRING$(25,191);
75 PRINTSTRING$(35," ");CHR$(184);STRING$(2,189);STRING$(26,191)
;
77 PRINTSTRING$(24," ");CHR$(160);"     ";CHR$(160);CHR$(168);STR
ING$(2,160);STRING$(31,191);
78 PRINT"            ";STRING$(3,160);" ";STRING$(2,184);CHR$(188)
;CHR$(190);CHR$(189);CHR$(188);CHR$(180);STRING$(2,188);CHR$(190
);CHR$(191);CHR$(190);CHR$(189);CHR$(188);CHR$(190);STRING$(35,1
91);
80 PRINT"   ";STRING$(3,176);CHR$(180);CHR$(184);STRING$(2,188);
STRING$(54,191);
81 PRINTCHR$(180);CHR$(176);CHR$(190);STRING$(61,191);
82 PRINTSTRING$(64,191);:PRINTTAB(15);"= PRESS ANY KEY TO CONTIN
UE =";
83 IFINKEY$=""THEN83
85 CLEAR2000:RANDOM:RESTORE
88 DIMP$(42),D(42,6)
90 FORA=1TO42:READP$(A)
95 FORB=1TO6:READD(A,B):NEXTB,A
100 DIMN$(17),NL(17)
105 FORA=1TO17:READN$(A),NL(A):NEXTA
110 DIMV$(11):FORA=1TO11:READV$(A):NEXTA
115 FORF=1TO14:READA:PW$=PW$+CHR$(A):NEXTF
120 LC=1:DIMGN(17)
125 CLS:INPUT"WOULD YOU LIKE AN INTRODUCTION ";A$
130 IFLEFT$(A$,1)<>"Y"THEN140
131 CLS:PRINTTAB(10);"== ESCAPE FROM <<COLDITZZ>> ADVENTURE =="
:PRINT
132 PRINT"THIS IS A VERY SIMPLE ADVENTURE, THERE ARE NO TREASURE
S
TO BE FOUND, POINTS TO BE SCORED OR WHATEVER."
133 PRINT"ALL YOU HAVE TO DO IS ESCAPE.
  BEFORE YOU CAN BEGIN AN ESCAPE ATTEMPT, YOU MUST COLLECT
A PERSONAL CIVILIAN ESCAPE KIT."
134 PRINT"THIS CONSISTS OF :-
(1) A COMPASS
(2) A DOCUMENT
(3) A MAP
(4) A UNIFORM
(5) A MEAL"
135 PRINT"BEWARE OF SEARCHLIGHTS, GUARDS AND WHEN AN >APPEL< IS
SOUNDED, IT IS ADVISABLE TO ATTEND."
136 IFINKEY$=""THEN136
137 CLS:PRINT"SOME OF THE COMMANDS AVAILABLE ARE :-
GO, GET, DROP, LOOK, OPEN, SAY, INVENT    ..... ETC."
138 IFINKEY$=""THEN138
140 CLS:PRINT"YOU ARE AT ";P$(LC)
142 TV=0:FORK=1TO17:IFNL(K)=LCANDK<>17ANDK<>10THENTV=-1
144 NEXTK:IFNOTTVTHEN220
150 PRINT"AROUND YOU THERE IS :-"
160 FORK=1TO17
```

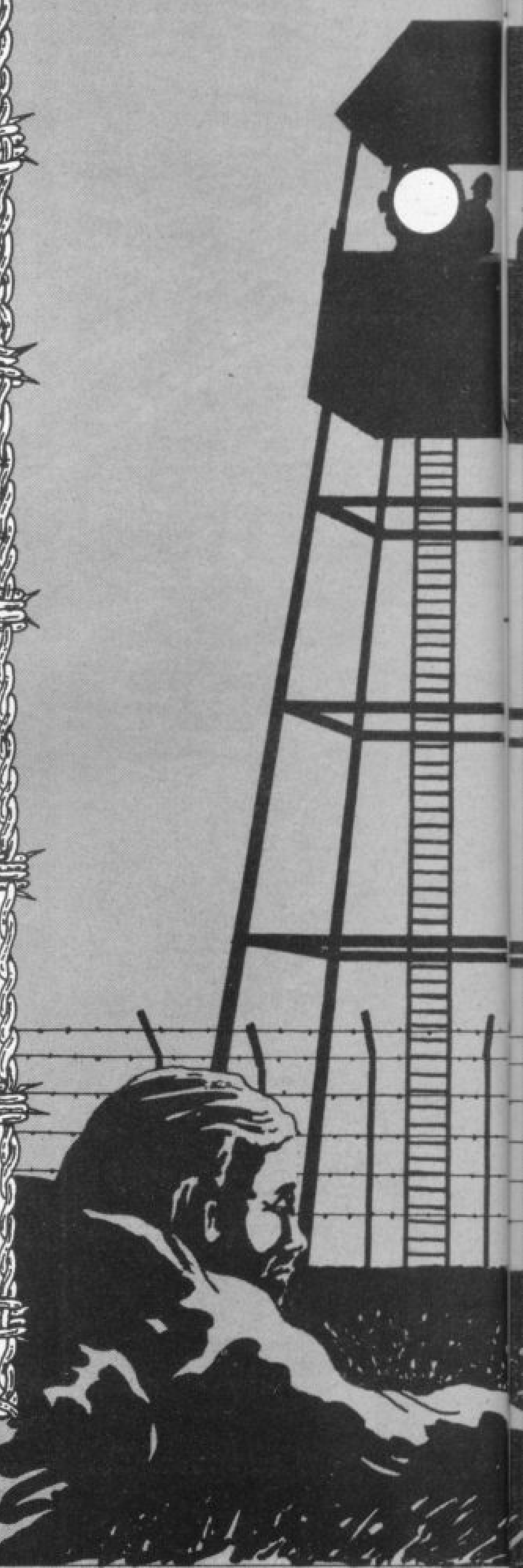
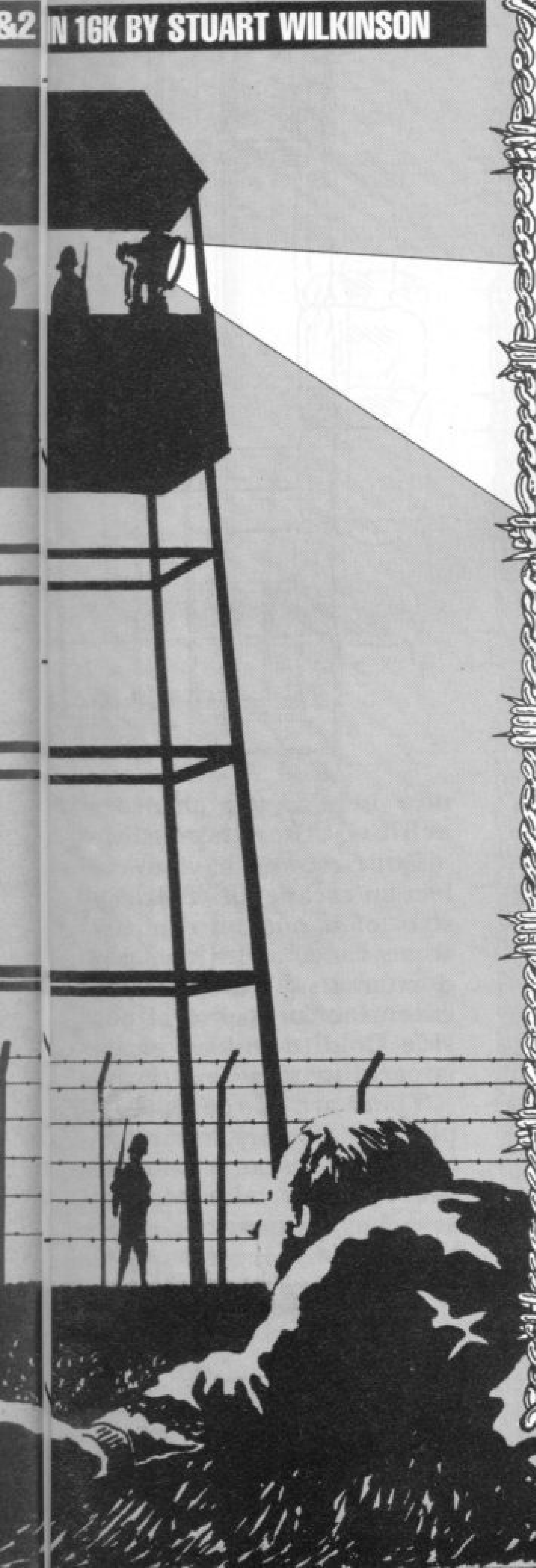


Illustration: Dorian Cross

dit3

&2 IN 16K BY STUART WILKINSON



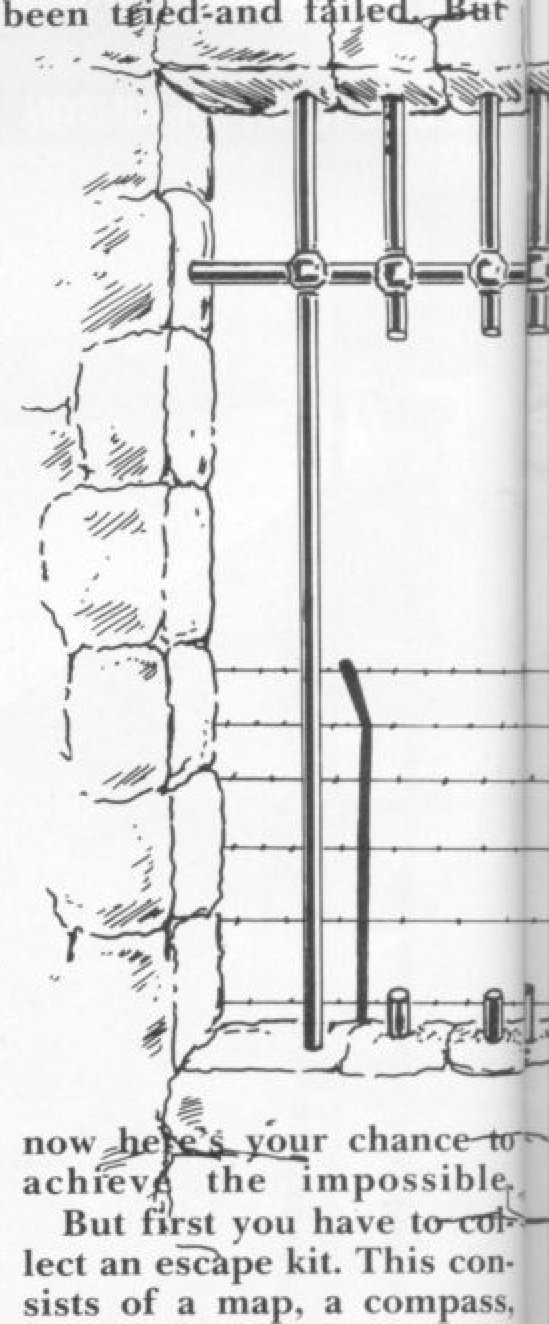
```
170 IF(K=17)OR(K=8)OR((K=10)AND(LC=34))OR((K=12)AND(LC=15))THEN1
90
180 IFNL(K)=LCTHENPRINT"A ";N$(K)
190 NEXTK
220 VB$="":NO$="":C$="":PRINT:INPUT"WHAT SHALL I DO ";C$:IFC$=""
THEN220
230 FORK=1TOLEN(C$):IFMID$(C$,K,1)=" "THEN240ELSEVB$=VB$+MID$(C$
,K,1):NEXTK
235 IFVB$=C$THENNO$=VB$:GOTO245
240 NO$=RIGHT$(C$,LEN(C$)-K)
242 IFVB$="SAY"THEN370
244 IFC$="CUT WIRE"ANDLC=9THEN360
245 IF(NO$="NORTH"ORNO$="WEST"ORNO$="EAST"ORNO$="SOUTH"ORNO$="UP
"ORNO$="DOWN")THEN246ELSE247
246 GOTO1000
247 IFVB$="OPEN"THEN4000
248 IFVB$="READ"THEN380
249 IFVB$=C$THEN270
250 FORK=1TO17:IFN$(K)<>NO$THENNEXTK:PRINT"I DON'T KNOW WHAT A
";NO$;"' IS !":GOTO220
255 IFVB$="DROP"THEN350
260 IFNL(K)<>LCANDNOTGN(K)THENPRINT"THERE ISN'T ONE HERE.":GOTO2
20
270 IFVB$="STAB"THEN10000
280 IFVB$="PRESS"THEN10100
290 FORK=1TO11:IFVB$<>V$(K)THENNEXTK:PRINT"I DON'T KNOW HOW TO D
O THAT.":GOTO220
300 IFVB$="LOOK"THEN140
310 IFVB$="INVENT"THEN9000
320 IFRND(60)=23AND(LC>4)AND(LC<>14)AND(LC<>29)THENGOSUB9500
330 IFRND(30)=14AND(LC<>1)THENGOTO9550
340 IFVB$="GET"THEN2000
350 IFVB$="DROP"THEN2500
360 IFVB$="CUT"THEN3000
370 IFVB$="SAY"THEN3100
380 IFVB$="READ"THEN3200
390 IFVB$="HIT"THEN500
500 IFLC=16ANDNO$="WALL"THEN550
510 PRINT"I WOULDN'T DO THAT - YOU MIGHT BRUISE YOUR HAND !":GOT
O220
550 LD(6)=-1:PRINT"A FALSE OAK PANEL SLIDES BACK TO REVEAL -
A SECRET STONE PASSAGE !":GOTO220
1000 IFNO$="NORTH"THENX=1ELSEIFNO$="EAST"THENX=2ELSEIFNO$="SOUTH
"THENX=3
1005 IFNO$="WEST"THENX=4ELSEIFNO$="UP"THENX=5ELSEIFNO$="DOWN"THE
NX=6
1010 IFX=4ANDNOTLD(5)ANDLC=12THENPRINT"A BLANK STONE WALL BARS T
HE WAY WEST.":GOTO220
1015 IFX=2ANDNOTLD(6)ANDLC=16THEN140
1020 IFX=1AND((NOTLD(1)ANDLC=4)OR(NOTLD(3)ANDLC=22))THENPRINT"A
LOCKED DOOR BARS THE WAY NORTH.":GOTO220
1030 IFX=3ANDNOTLD(1)ANDLC=11THENPRINT"A LOCKED DOOR BARS THE WA
Y SOUTH.":GOTO220
1040 IFX=2ANDNOTLD(4)ANDLC=17THENPRINT"A LOCKED DOOR BARS THE WA
Y EAST":GOTO220
1050 IFX=4ANDLC=19ANDNOTLD(2)THENPRINT"A LOCKED DOOR BARS THE WA
Y WEST.":GOTO220
1060 IF(LC=7ANDX=1)OR(LC=17ANDX=2ANDLD(4))OR(LC=28AND(X=1ORX=2))
THEN1070ELSE1110
1070 IFNOTEKTHENPRINT"YOU CAN'T ATTEMPT AN ESCAPE HERE -
YOU HAVEN'T GOT AN ESCAPE KIT !!":GOTO220
1080 IFLC=28AND(X=1ORX=2)ANDNOTGN(7)THENPRINT"YOU'LL NEED A ROPE
 TO GET DOWN THERE !":GOTO220ELSEIF(LC=28ANDX=1)THENPRINT"A SEAR
CH-LIGHT GLARES YOU FULL IN THE FACE !!!":FORF=1TO1000:NEXTF:GOT
O15000ELSEIF(LC=28ANDX=2)THEN16000
1090 IFX=2ANDLC=17THEN15000
1100 IFX=1ANDLC=7THENIFRND(2)=2THEN16000ELSE15000
1110 IFLC=9AND(X=1ORX=4)THENPRINT"AN ELECTRIC BARBED WIRE PREVEN
TS ESCAPE HERE !!":GOTO220
1112 IFLC=27ANDX=1ANDNOTGN(8)THENLC=9:X=6:GOTO1120
```

```
1115 IFLC=21ANDX=5ANDNOTGN(2)THENPRINT"YOU'LL NEED A LADDER TO G
ET UP THERE !":GOTO220
1120 IFLC=9ANDX=6THENPRINT"SUDDENLY A SEARCHLIGHT GLARES YOU FUL
L IN THE FACE !!!":FORR=1TO1000:NEXTR:GOTO15000
1130 IFLC=6ANDX=1THENPRINT"SUDDENLY A GUARD STEPS OUT IN FRONT O
F YOU.":INPUT"WHAT IS THE PASSWORD ";GG$:IFGG$<>PW$THEN15000ELSE
PRINT"O.K. YOU MAY PASS THROUGH.":FORF=1TO750:NEXTF
1140 LC=D(LC,X)
1150 IFLC=5THENPRINT"THE GUARD ON DUTY STOPS YOU.":INPUT"WHAT IS
 YOUR IDENTIFICATION ";ID$:IFID$<>"SHOW CARD"ANDID$<>"PASS CARD"
ANDID$<>"SHOW PASS CARD"ORNOTGN(15)THEN15000
1160 GOTO140
2000 IFCR=7THENPRINT"YOU CAN'T CARRY ANY MORE THINGS !
( PERHAPS YOU COULD DROP SOMETHING ? )":GOTO220
2010 IFNO$="GUARD"ORNO$="WALL"THENPRINT"DON'T BE RIDICULOUS !":G
OTO220
2020 IFNO$="BUTTON"THENPRINT"IT IS FIXED TO THE DESK !!":GOTO220
2030 FORK=1TO16:IFNO$<>N$(K)THENNEXTK
2035 IFGN(K)THENPRINT"YOU'RE ALREADY CARRYING IT !":GOTO220ELSEG
N(K)=-1
2040 PRINT"O.K.":CR=CR+1:NL(K)=0
2045 IFK<>1ANDK<>5ANDK<>9ANDK<>10ANDK<>12THEN2060
2050 IFGN(1)ANDGN(5)ANDGN(9)ANDGN(10)ANDGN(12)THENEK=-1:PRINT"YO
U HAVE NOW GOT YOUR PERSONAL CIVILIAN ESCAPE KIT !"
2060 GOTO220
2500 FORK=1TO17:IFNO$<>N$(K)THENNEXTK
2510 IFNO$="WALL"ORNO$="GUARD"THENPRINT"DON'T BE STUPID !":GOTO2
20
2520 IFNOTGN(K)THENPRINT"YOU'RE NOT CARRYING IT !":GOTO220
2522 IFEKAND(K=1ORK=5ORK=9ORK=10ORK=12)THENPRINT"YOU NO LONGER H
AVE A FULL PERSONAL CIVILIAN ESCAPE KIT.":EK=0
2530 CR=CR-1:NL(K)=LC:GN(K)=0:PRINT"O.K.":GOTO220
3000 IFNOTGN(4)THENPRINT"YOU NEED A KNIFE !!":GOTO220
3010 IFNO$="WIRE"ANDLC=9THENPRINT"AAAAAAARRRRGGHHHHHH !!!!!!!!
10000 VOLTS HAVE JUST RUN THROUGH YOU, CONVERTING YOU INTO A
FRAZZLE !!":END
3020 IFNO$<>"WIRE"THENPRINT"WHAT'S THE POINT IN CUTTING YOUR ";N
O$;" ?":GOTO220
3030 PRINT"O.K.":GN(8)=-1:NL(8)=99:GOTO220
3100 PRINT"O.K.      ";NO$:GOTO220
3200 IFNO$<>"TAG"ANDNO$<>"DOCUMENT"ANDNO$<>"PASS CARD"ANDNO$<>"M
AP"THENPRINT"I DON'T KNOW HOW TO READ A ";NO$:GOTO220
3210 IFNO$="DOCUMENT"ANDNOTGN(5)THENPRINT"YOU DON'T HAVE A ";NO$
:GOTO220
3220 IFNO$="MAP"ANDNOTGN(1)THENPRINT"YOU DON'T HAVE A MAP.":GOTO
220
3230 IFNO$="PASS CARD"ANDNOTGN(15)THENPRINT"YOU DON'T HAVE A ";N
O$:GOTO220
3240 IFNO$="TAG"ANDNOTGN(16)THENPRINT"YOU DON'T HAVE A TAG.":GOT
O220
3250 IFNO$="DOCUMENT"ORNO$="PASS CARD"ORNO$="MAP"THENPRINT"THERE
'S NO POINT IN READING IT.":GOTO220
3260 PRINT"IT SAYS  'DER BEUTELMAUS'":GOTO220
4000 IFNO$<>"DOOR"ANDNO$<>"PARCEL"ANDNO$<>"CUPBOARD"THENPRINT"I
DON'T KNOW HOW TO OPEN A '";NO$;"'":GOTO220
4010 IFNO$="CUPBOARD"THENPRINT"THE CUPBOARD WON'T OPEN - IT'S LO
CKED.":GOTO220
4020 IFNO$<>"PARCEL"THEN4050
4025 IFNOTGN(11)THENPRINT"WHAT PARCEL ???":GOTO220
4030 GN(11)=0:NL(11)=999:GN(12)=-1:NL(12)=0
4035 PRINT"THERE IS A MEAL IN IT !!"
4040 GOTO2050
4050 IFNOTGN(3)THENPRINT"YOU'LL NEED A KEY TO GET THROUGH THAT D
OOR !":GOTO220
4060 IFLC=4ORLC=11THENLD(1)=-1:GOTO4110
4070 IFLC=19ORLC=18THENLD(2)=-1:GOTO4110
4080 IFLC=22ORLC=21THENLD(3)=-1:GOTO4110
4090 IFLC=17THENLD(4)=-1:GOTO4110
4100 PRINT"THERE ISN'T A LOCKED DOOR HERE !":GOTO220
4110 PRINT"O.K. IT'S OPEN.":GOTO220
9000 PRINT"YOU ARE CARRYING :-"         ' INVENTORY
9010 FORK=1TO17:IF(K=12ANDGN(11))ORK=8THENNEXTKELSEIFGN(K)THENIT
=-1:PRINT"A ";N$(K)
9020 NEXTK:IFNOTITTHENPRINT"NOTHING."
9030 IT=0:GOTO220
9500 CLS:PRINT"A GUARD SUDDENLY APPEARS AND SEARCHES YOU ...."
9510 PRINT"HE FINDS :-":TV=0
9520 FORK=1TO16:IFGN(K)THENPRINT"A ";N$(K):TV=-1
9530 NEXTK:IFNOTTVTHENPRINT"NOTHING.  YOU MAY GO FREE.":RETURN
9540 FORA=1TO2000:NEXTA:GOTO15000
9550 CLS:PRINT"           <<<<<<< A P P E L >>>>>>>"
9560 INPUT"DO YOU WANT TO ATTEND ( Y/N ) ";A$
9570 IFLEFT$(A$,1)<>"Y"THEN9610
9580 IFGN(2)THENPRINT"YOU'LL HAVE TO LEAVE THE ";N$(2);" HERE.":
GN(2)=0:NL(2)=LC:CR=CR-1
9590 IFGN(10)THENPRINT"YOU'LL HAVE TO LEAVE THE ";N$(10);" HERE.
":GN(10)=0:NL(10)=LC:CR=CR-1
9595 FORF=1TO1250:NEXTF
9600 LC=1:GOTO140
```

Illustration : DorianCross

Colditz. The name strikes terror into the heart of every prisoner of war. The grim fortress is apparently escape proof. Not even the most experienced escapers have managed to break out from within its imposing walls.

Every way of escape has been tried and failed. But

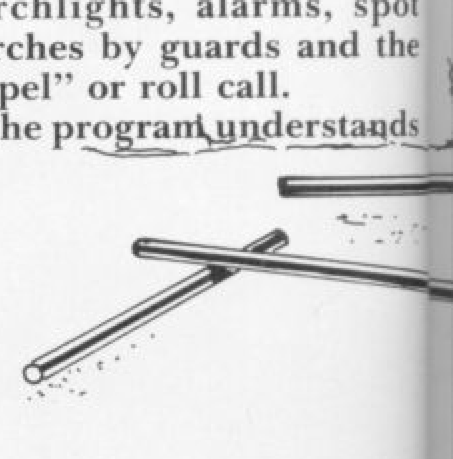


now here's your chance to achieve the impossible.

But first you have to collect an escape kit. This consists of a map, a compass, some food, a uniform and documents. These items are essential for survival outside Colditz and no escape is permitted without them.

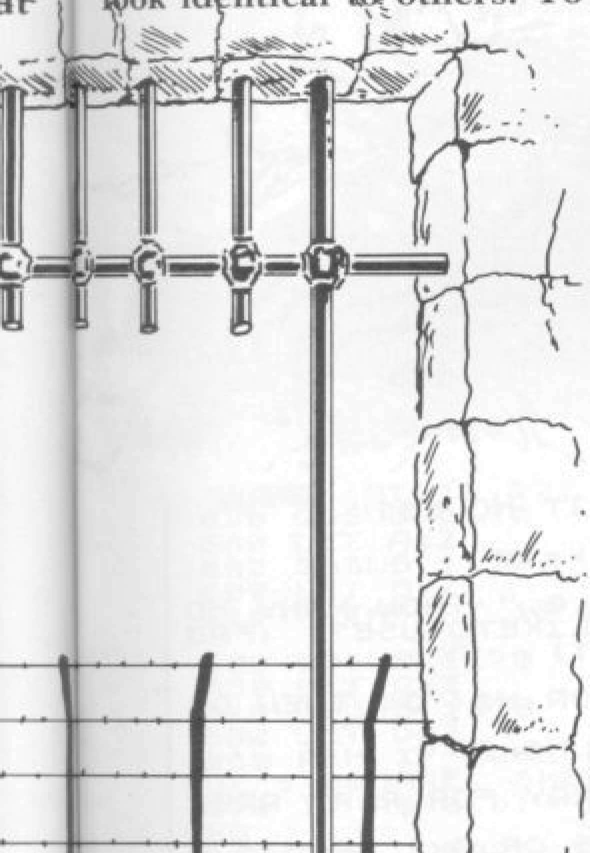
There are 42 rooms to explore and many hazards to avoid. These include searchlights, alarms, spot searches by guards and the "appel" or roll call.

The program understands



two word commands and there is an extensive array of error messages.

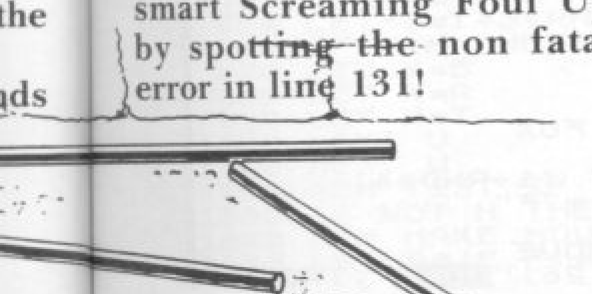
The only direction commands you have to use are; north, south, east, west, up and down. If a direction is not possible your previous location will be displayed. But beware. Some locations look identical to others. To



recap on where you are simply type in LOOK. To list what you are carrying type INVENT.

The printout is set at 64 characters wide and the end of each line of printing should correspond to the end of each line on the screen as the program is typed in.

Here's a little test for you while you are typing in the listing. See if you can outsmart Screaming Foul Up by spotting the non fatal error in line 131!



```
9610 IFRND(2)=2THEN15000
9620 PRINT"THE GAMBLE PAID OFF.  YOU GOT AWAY WITH IT.":GOTO220
10000 IFNOTGN(4)THENPRINT"YOU HAVEN'T GOT A KNIFE !":GOTO220
10010 IFNO$<>"GUARD"THENPRINT"WHAT'S THE POINT IN DOING THAT ?":
GOTO220
10020 CLS:PRINT" U H H ! ! !
THE GUARD IS DYING .......":FORF=1TO400:NEXTF:PRINT"BUT HE MANAG
ES TO MAKE IT TO THE ALARM BUTTON !":FORF=1TO800:NEXT:GOTO15000
10100 IFNO$<>"BUTTON"THENPRINT"O.K.     SO WHAT ??":GOTO220
10110 INPUT"WHICH BUTTON ? - THERE ARE TWO,
A RED ONE
AND A BLUE ONE ";CL$:IFCL$=""THEN10110
10120 IFCL$<>"RED"THENPRINT"YIPES !!!!  ALARM BELLS ARE RINGING
THROUGHOUT THE PRISON !!!!":FORF=1TO1000:NEXT:GOTO15000
10130 PRINT"A SECRET HIDDEN PANEL IN THE WEST WALL SWINGS ASIDE.
":LD(5)=-1:GOTO220
15000 CLS:PRINT"     < < <   H A N D E   H O C H ! ! !   > >
>

 A RING OF GERMAN GUARDS ARE POINTING THEIR MACHINE GUNS
AT YOU  ! ! !    YOU HAVE BEEN FOUND GUILTY OF TRYING TO
ESCAPE, AND WILL BE SHOT AT DAWN !!.":END
16000 CLS:PRINT"   ---=== C O N G R A T U L A T I O N S ! ! ! ==
=---

YOU HAVE ESCAPED FROM THE CASTLE SUCCESFULLY !!!!":END
20000 DATA"THE APPEL SECTION OF THE PRISONER'S COURTYARD.",5,10,
2,4,1,1
20001 DATA"THE PRISONER'S COURTYARD.
THERE IS A MANHOLE COVER BY THE WALL.",1,20,24,3,2,40
20002 DATA"THE PRISONER'S COURTYARD.",4,2,25,19,3,3
20003 DATA"THE PRISONER'S COURTYARD.",11,1,3,14,4,4
20004 DATA"THE GUARDHOUSE.",6,8,1,11,5,5
20005 DATA"THE ROADWAY OUT TO THE GATEHOUSE.",7,6,5,9,6,6
20006 DATA"THE GATEHOUSE.",43,7,6,7,7,7
20007 DATA"THE GUARDHOUSE CUPBOARD.",8,8,8,5,8,8
20008 DATA"THE EXERCISE YARD.
BARBED WIRE ELECTRIC FENCES PREVENT ESCAPE HERE.
HOWEVER THERE IS A MANHOLE COVER ON THE FLOOR.",9,6,9,9,9,9
20009 DATA"THE CHAPEL.",10,16,10,1,10,10
20010 DATA"THE CAMP COMMANDER'S OFFICE.",11,5,4,12,11,11
20011 DATA"THE INTERROGATION ROOM.
THERE IS A DESK HERE.",12,11,12,13,12,12
20012 DATA"THE FILING ROOM
THERE IS A FILING CABINET AGAINST THE WALL.",13,12,13,13,13,13
20013 DATA"A SPIRAL STAIRCASE LANDING.",14,4,19,15,29,14
20014 DATA"THE PARCELS OFFICE.",15,14,15,15,15,15
20015 DATA"THE VESTRY.
THE EASTERN WALL IS OAK-PANELLED.",16,17,16,10,16,16
20016 DATA"AN OUTSIDE STORAGE SHED.",17,43,17,16,17,17
20017 DATA"THE TOP OF A FLIGHT OF SECRET STONE STAIRS.",18,19,18
,18,18,37
20018 DATA"THE CANTEEN KITCHEN.
A CUPBOARD IS ON THE WALL.",14,3,19,18,19,19
20019 DATA"THE DENTIST'S SURGERY.",20,20,20,2,20,20
20020 DATA"A DRESSING ROOM.
THERE IS A TRAP-DOOR IN THE CEILING.",21,21,22,21,27,21
20021 DATA"THE STAGE.",21,22,22,23,22,22
20022 DATA"THE THEATRE.",23,22,23,24,23,23
20023 DATA"THE THEATRE.",2,23,24,24,24,24
20024 DATA"THE SICK-BAY.",3,25,25,26,25,25
20025 DATA"THE SHOWER-ROOM.",26,25,26,26,26,26
20026 DATA"A DISUSED STORE ROOM.
A THICK WIRE RUNS ALONG ONE WALL.",28,27,27,27,27,21
20027 DATA"A ROOFTOP.",43,43,27,28,28,28
20028 DATA"THE LANDING OF A SPIRAL STAIRCASE.",32,29,30,36,29,14
20029 DATA"THE OFFICER'S QUARTERS.",29,30,31,30,30,30
20030 DATA"THE ORDERLY'S QUARTERS.",30,31,31,31,31,31
20031 DATA"A BATHROOM.",32,33,29,35,32,32
20032 DATA"THE SENIOR OFFICER'S QUARTERS.",33,34,33,32,33,33
20033 DATA"THE LAUNDRY.",34,34,34,33,34,34
20034 DATA"THE OFFICER'S MESS.",35,32,36,35,35,35
20035 DATA"THE CANTEEN.",35,29,36,36,36,36
20036 DATA"A STONE WALLED TUNNEL.
IT'S PITCH BLACK.",38,37,37,37,18,37
20037 DATA"AN ALCOVE IN THE TUNNEL.",38,39,37,38,38,38
20038 DATA"THE END OF THE TUNNEL.
A RUNG-LADDER LEADS UPWARDS.",39,39,39,38,8,39
20039 DATA"THE END OF A SEWER PIPE.",40,40,41,40,2,40
20040 DATA"A JUNCTION IN THE SEWER PIPE.",40,41,41,42,41,41
20041 DATA"THE END OF THE PIPE.
ABOVE, THERE IS AN IRON-BARRED GRILL.",42,41,42,42,26,42
20042 DATA"MAP",38,"LADDER",22,"KEY",8,"KNIFE",41,"DOCUMENT",13,
"BUTTON",12,"ROPE",27,"WIRE",27
20043 DATA"COMPASS",35,"UNIFORM",34,"PARCEL",15,"MEAL",99,"GUARD
",5,"GUARD",7,"PASS CARD",20,"TAG",31,"WALL",16
20044 DATA"GO","GET","DROP","OPEN","CUT","HIT","SHOW","SAY","REA
D","INVENT","LOOK"
20045 DATA68,69,82,32,66,69,85,84,69,76,77,65,85,83
```



RUNS ON A ZX81 IN 16K

The fox is a cunning creature. It can outwit the most experienced pack of hounds and baffle the farmer who keeps loosing chickens to this swift and silent hunter.

Now you can attempt to trap the elusive animal in this original game for the Sinclair ZX81. You are the master of the hunt, in charge of a ferocious pack of hounds. All you have to do is manoeuvre your hounds into a position to catch the fox around a chess board style display. There's just one problem. The fox is virtually invisible.

It only appears briefly at the start of the chase, when it leaps over one of the pursuing hounds or when a hound attempts to move into the same square which the fox is occupying. The program includes an easier version of the game for beginners which allows the player to see the fox whenever it moves. But we know Computer and Video Games readers don't like things too easy — do you!

Although the entire program is written in Basic the response time is rapid. Slow mode is used apart from the initial setting up of the board, giving a constant and flicker free display.

The game is won once the fox is trapped. Out you lose if the fox escapes to the bottom of the screen. As master of the hunt you can choose how many hounds you wish to use in the chase — any number from three to eight. This gives a considerable range of difficulty.

The program inputs are error trapped, and non-valid inputs simply result in the input being requested again.

BY GORDON STEVENS

```
  10 RAND
  20 REM RESERVE LINES FOR BASIC
 IN LOWER SCREEN
  30 POKE 16418,2
  40 CLS
  50 PRINT TAB 10;"""FOX AT DUSK
"""  ,,,"  TRAP THE FOX SO IT CANNO
T MOVE.FOX AND HOUNDS MOVE ONE S
PACE     DIAGONALLY UP OR DOWN, BU
T THE  FOX MAY LEAP OVER A HOUND
.","    ENTER MOVES COLUMN FIRST
THENTHE ROW.. E.G. 11 IS BOTTOM
LEFTCORNER.",,
  60 PRINT "  AT DUSK THE FOX CA
N ONLY BE   SEEN AT THE GAME STA
RT, WHEN IT LEAPS OVER A HOUND,
OR WHEN A   HOUND TRIES TO MOVE
INTO THE    SQUARE THAT THE FOX
IS IN.",,,,,,,,"WOULD YOU PREFER
THE EASIER GAMEWHERE YOU SEE THE
FOX WHENEVER  IT MOVES?"
  70 INPUT B$
  80 LET I=B$(1)="Y"
  90 CLS
 100 PRINT AT 4,0;"  HOW MANY HO
UNDS WOULD YOU LIKETO USE?  (FRO
M THREE TO EIGHT)   "
 110 INPUT H$
 120 IF H$>"8" OR H$<"3" THEN GO
TO 110
 130 LET H=CODE H$-28
 140 FAST
 150 REM SET ARRAY FOR PLAY AREA
 160 DIM A$(8,8)
 170 LET B$="A>8 OR A<1 OR B>8 O
R B<1"
 180 CLS
 190 REM RESERVE NO LINES FOR
BASIC
 200 POKE 16418,0
 210 REM DISPLAY BOARD
 220 FOR A=0 TO 7
 230 FOR B=0 TO 2
 240 LET D=3*(A-2*INT (A/2))
 250 FOR C=0 TO 3
 260 PRINT TAB (D+C*6);"▒▒▒";
 270 NEXT C
 280 NEXT B
 290 NEXT A
 300 PRINT AT 2,25;"FOX AT";TAB
25;"███████";TAB 26;"DUSK";TAB 26
;"█████"
 310 REM PUT B"S INTO NON-PLAY
SQUARES
 320 FOR A=1 TO 8
 330 FOR B=1 TO 8
 340 IF (A+B)/2<>INT ((A+B)/2) T
HEN LET A$(A,B)="B"
 350 NEXT B
 360 NEXT A
 370 REM SET UP HOUND POSITIONS
 380 FOR A=1 TO 2
 390 FOR B=1 TO 8
 400 IF NOT H THEN GOTO 490
 410 IF A$(B,A)="B" THEN GOTO 47
0
 420 LET A$(B,A)="H"
 430 LET H=H-1
 440 LET X=B
 450 LET Y=A
 460 GOSUB 1250
 470 NEXT B
 480 NEXT A
 490 SLOW
 500 REM SET UP FOX
 510 LET F=8
 520 LET E=2*INT (1+RND*4)
 530 LET A$(E,F)="F"
 540 GOSUB 1500
 550 REM INPUT MOVE
 560 PRINT AT 7,26;"MOVE";TAB 26
```

Fox at Dusk



Illustration: Jon Davis

```
;"FROM";AT 10,27;
 570 GOSUB 1170
 580 LET A=Z
 590 GOSUB 1170
 600 LET B=Z
 610 PRINT AT 12,27;"TO";AT 14,2
7;
 620 GOSUB 1170
 630 LET C=Z
 640 GOSUB 1170
 650 LET D=Z
 660 REM IF MOVE ATTEMPTED TO
FOX"S SQUARE, SHOW FOX
 670 IF A$(C,D)="F" THEN GOSUB 1
500
 680 REM CLEAR MOVE DISPLAY
 690 PRINT AT 7,26;"     ";TAB 26
;"     ";AT 10,27;"   ";AT 12,27;"
  ";AT 14,27;"  "
 700 REM CHECK FOR VALID MOVE
 710 IF ABS (A-C)>1 OR ABS (B-D)
>1 OR A$(A,B)<>"H" OR A$(C,D)<>"
" THEN GOTO 550
 720 REM MOVE HOUND
 730 LET X=A
 740 LET Y=B
 750 GOSUB 1330
 760 LET A$(A,B)=" "
 770 LET X=C
 780 LET Y=D
 790 GOSUB 1250
 800 LET A$(C,D)="H"
 810 REM SELECT FOX MOVE
 820 LET M=0
 830 FOR W=F-1 TO F+1 STEP 2
 840 FOR V=E-1 TO E+1 STEP 2
 850 LET A=V
 860 LET B=W
 870 REM TEST IF MOVE OFF BOARD
 880 IF VAL B$ THEN GOTO 1000
 890 LET T=0
 900 REM TEST FOR POSSIBLE LEAP
OVER HOUND
 910 IF A$(A,B)="H" THEN GOTO 13
70
 920 REM TEST FOR VALID MOVE
 930 IF A$(A,B)<>" " THEN GOTO 1
000
 940 REM SCORE MOVE AND RECORD
IF BEST SO FAR
 950 LET T=T+3*RND+(B<F)+(B=1)
 960 IF T<M THEN GOTO 1000
 970 LET Y=B
 980 LET X=A
 990 LET M=T
1000 NEXT V
1010 NEXT W
1020 REM TEST IF MOVE POSSIBLE
1030 IF NOT M THEN GOTO 1430
1040 REM MAKE MOVE
1050 LET A$(E,F)=" "
1060 LET A$(X,Y)="F"
1070 REM DISPLAY FOX IF LEAPING
OVER HOUND
1080 LET G=ABS (E-X)>1
1090 IF G THEN GOSUB 1500
1100 LET E=X
1110 LET F=Y
1120 REM TEST IF FOX WINS
1130 IF Y=1 THEN GOTO 1470
1140 REM DISPLAY FOX IF LEAPING
OVER HOUND OR FOR EASY GAME
1150 IF G OR I THEN GOSUB 1500
1160 GOTO 550
1170 REM INPUT FROM KEYBOARD
1180 IF INKEY$<>"" THEN GOTO 118
0
1190 LET C$=INKEY$
1200 IF C$="" THEN GOTO 1190
1210 IF C$>"8" OR C$<"1" THEN GO
TO 1180
1220 PRINT C$;
1230 LET Z=CODE C$-28
1240 RETURN
1250 REM PRINT HOUND
1260 LET Z=3*(X-1)
1270 PRINT AT 3*(8-Y),Z;"/ ▙";TA
B Z;"███ ";TAB Z;"▌▐"
1280 RETURN
1290 REM PRINT FOX
1300 LET Z=3*(E-1)
1310 PRINT AT 3*(8-F),Z;"▙ ▟";TA
B Z;"███";TAB Z;" █ "
1320 RETURN
1330 REM PRINT BLANK SQUARE
1340 LET Z=3*(X-1)
1350 PRINT AT 3*(8-Y),Z;"   ";TA
B Z;"   ";TAB Z;"   "
1360 RETURN
1370 REM TEST FOR FOX LEAP OVER
HOUND
1380 LET A=V+(V-E)
1390 LET B=W+(W-F)
1400 IF VAL B$ THEN GOTO 1000
1410 LET T=RND
1420 GOTO 920
1430 GOSUB 1290
1440 PRINT AT 8,25;"YOU WIN"
1450 PAUSE 40000
1460 GOTO 20
1470 GOSUB 1290
1480 PRINT AT 8,25;"I WIN"
1490 GOTO 1450
1500 REM FLASH FOX DISPLAY
1510 FOR A=1 TO 4
1520 GOSUB 1290
1530 FOR B=1 TO 4
1540 NEXT B
1550 PRINT AT 3*(8-F),Z;"   ";TA
B Z;"   ";TAB Z;"   "
1560 NEXT A
1570 RETURN
```

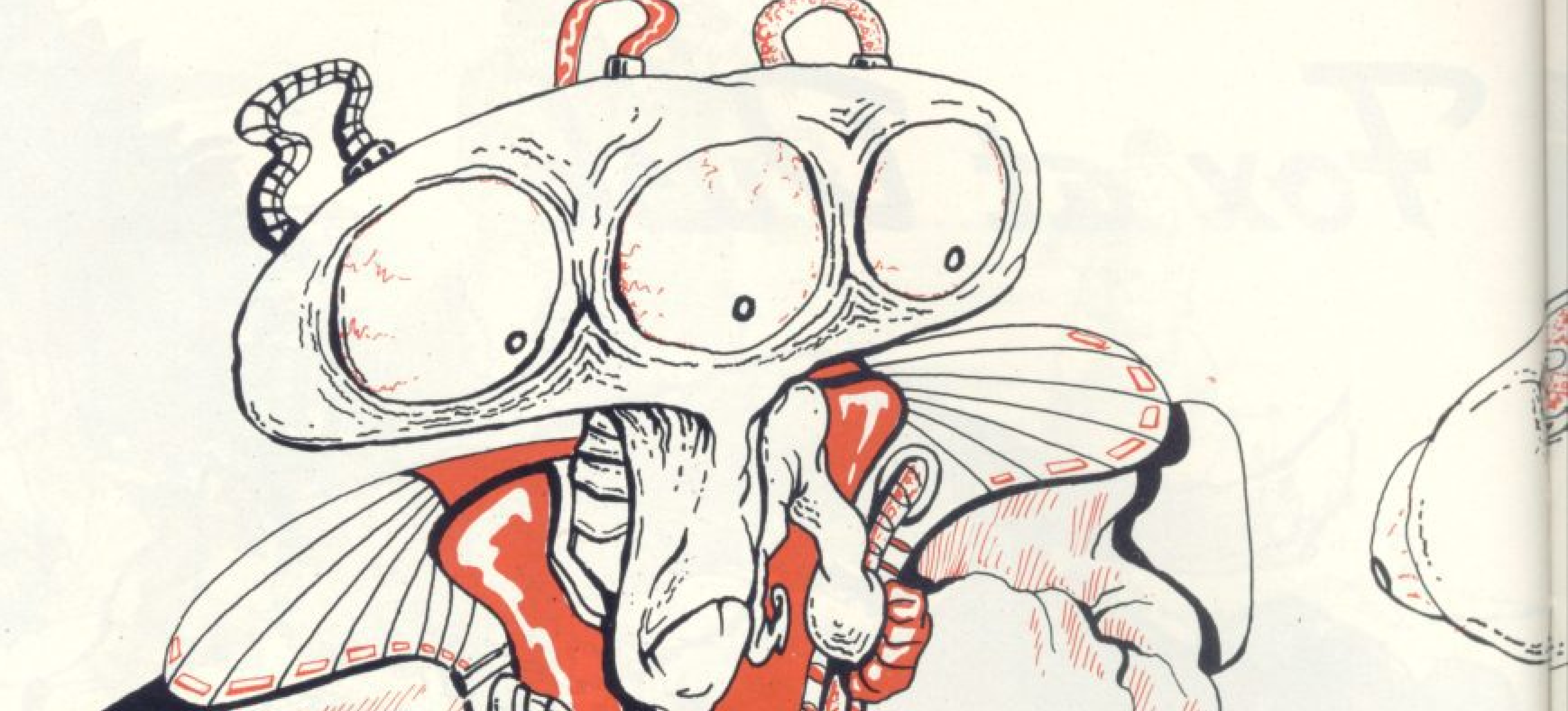


Illustration: Dorian Cross

DIAMOND DRAUGHTS

Fed up with nasty green aliens firing their noisy laser guns at you? Well here's a game that will bring you back to earth. It's a version of that old board game favourite Draughts — as played in pubs, clubs and front rooms across the universe. Maybe those aliens will take a break from destroying the odd planet to enjoy a quick game — if they can lay their tentacles on a Spectrum that is!

The game is for two players. One player uses green counters, the other white. The rules are exactly the same as the regular board game — slip out of your spacesuit, unload the electron gun and enjoy an earth bound game for a change.

BY PAT NORRIS

RUNS ON A SPECTRUM IN 16K

```
   2 REM DIAMONDS © 1982 MICROX
   3 GO SUB 600
   4 PRINT INK 2;"Enter VERTICAL
 COORD first"
   5 PRINT
   6 PRINT "Score:- White=0   Gr
een=0"
   7 PRINT
   8 GO SUB 900
   9 LET cm=0
  10 LET a$="  █  █  █  █"
  15 LET c$="     "
  20 LET b$="█  █  █  █   "
  25 LET c=0: LET d=0: LET j=0
  30 FOR a=1 TO 4
  40 PRINT INK 1;c$;a$
  45 PRINT INK 1;c$;a$
  50 PRINT INK 1;c$;b$
  60 PRINT INK 1;c$;b$
  80 NEXT a
  81 FOR a=8 TO 20 STEP 4: PRINT
 AT 4,a; PAPER 4; INK 1;"▀";AT
```



```
5,a;"■": NEXT a
  82 FOR a=6 TO 18 STEP 4: PRINT
 AT 6,a; PAPER 4; INK 1;"■";AT
7,a;"■": NEXT a
  84 FOR a=8 TO 20 STEP 4: PRINT
 AT 8,a; PAPER 4; INK 1;"■";AT
9,a;"■": NEXT a
  87 FOR a=6 TO 18 STEP 4: PRINT
 AT 14,a; PAPER 7; INK 1;"■";AT
 15,a;"■": NEXT a
  88 FOR a=8 TO 20 STEP 4: PRINT
 AT 16,a; PAPER 7; INK 1;"■";AT
 17,a;"■": NEXT a
  89 FOR a=6 TO 18 STEP 4: PRINT
 AT 18,a; PAPER 7; INK 1;"■";AT
 19,a;"■": NEXT a
  90 INK 1
  92 PLOT 47,144: DRAW 128,0: DR
AW 0,-128
  95 DRAW -128,0: DRAW 0,128
  96 INK 0
  97 LET l=6
 100 FOR a=1 TO 8
 105 PRINT AT 20,l;CHR$ (a+47);
 107 LET l=l+2
 110 NEXT a
 115 FOR e=1 TO 8
 120 PRINT AT e*2+2,4;e
 125 NEXT e
 130 LET u=RND
 135 IF u>.5 THEN GO TO 410
 200 LET e=0: LET aa=0: LET q=0:
 LET s=0: LET z=0: LET p=1: LET
n=b: LET o=bq
 210 PRINT AT 10,25; INK 2;"Whit
es";AT 11,26;"move": GO SUB 215:
 GO TO 224
 215 INPUT "Input from/to (eg.31
42) ";m$
 220 IF LEN m$<>4 THEN GO TO 200
 221 FOR i=1 TO 4
 222 IF (CODE m$(i)<48) OR (CODE
 m$(i)>56) THEN GO TO 200
 223 NEXT i: RETURN
 224 LET m=VAL m$
 235 LET f=INT (m/100)
 236 LET t=INT (m-(f*100))
 237 IF a(t)<>0 THEN GO SUB 242:
 GO TO 200
 238 LET k=f-t: LET s=k: IF ABS
(k)>11 THEN GO SUB 700
 239 IF p=0 THEN GO SUB 242: GO
TO 200
 240 IF ABS (k)<12 AND cm=1 THEN
 GO SUB 860: GO TO 385
 241 GO TO 245
 242 PRINT AT 14,24; INK 2;"INVA
LID";AT 15,25;"MOVE": FOR U=1 TO
 100: NEXT u: PRINT AT 14,24;"
     ";AT 15,25;"    ": RETURN
 245 IF a(f)=w OR a(f)=wq THEN G
O TO 260
 247 GO SUB 242: GO TO 200
 260 IF a(f)=w AND s<9 OR s=10 O
R s>22 THEN GO SUB 242: GO TO 20
0
 265 IF a(f)=wq THEN LET z=1: GO
 TO 295
 275 LET a(f)=0: LET a(t)=w: GO
SUB 317: GO TO 325
 295 LET a(f)=0: LET a(t)=wq: GO
 SUB 300: GO TO 325
 300 IF k=-18 THEN LET a((t)-9)=
0
 310 IF k=-22 THEN LET a((t)-11)
=0
 317 IF k=18 THEN LET a((f)-9)=0
 320 IF k=22 THEN LET a((f)-11)=
0
 322 RETURN
 325 IF s=18 OR s=-18 OR s=22 OR
 s=-22 THEN LET c=c+1: PRINT AT
2,14;c
 330 IF t=11 OR t=13 OR t=15 OR
t=17 THEN LET a(t)=wq
 333 GO SUB 335: GO TO 340
 335 LET fx=VAL m$(1)*2+2: LET f
y=VAL m$(2)*2+6
 337 LET tx=VAL m$(3)*2+2: LET t
y=VAL m$(4)*2+6
 338 PRINT AT fx,fy; INK 1;"■";
AT fx+1,fy;"■": RETURN
 340 IF ABS (k)>11 THEN GO TO 35
0
 343 GO SUB 345: GO TO 385
 345 IF a(t)=w THEN PRINT AT tx,
ty; PAPER 7; INK 1;"■";AT tx+1,
ty;"■"
 347 IF a(t)=wq THEN PRINT AT tx
,ty; PAPER 7; INK 1;"■";AT tx+1
,ty;"■"
 348 RETURN
 350 GO SUB 345: GO SUB 355: GO
TO 380
 355 IF k=-18 THEN PRINT AT tx-2
,ty+2; INK 1;"■";AT tx-1,ty+2;"
■"
 360 IF k=-22 THEN PRINT AT tx-2
,ty-2; INK 1;"■";AT tx-1,ty-2;"
■"
 365 IF k=18 THEN PRINT AT tx+2,
ty-2; INK 1;"■";AT tx+3,ty-2;"■
■"
 370 IF k=22 THEN PRINT AT tx+2,
ty+2; INK 1;"■";AT tx+3,ty+2;"■
■"
 375 RETURN
 380 IF s=-18 OR s=18 OR s=-22 OR s=22 THEN GO
 SUB 395: IF aa=410 THEN GO TO 385
 382 GO TO aa
 385 LET cm=0: LET s=0: IF c=12
THEN GO TO 800
 390 GO TO 410
 395 PRINT AT 14,24; INK 2;"Is m
ove";AT 15,24;"complete";AT 16,2
4;"(y or n)"
 396 IF INKEYS="" THEN GO TO 395
 397 IF INKEY$="n" THEN PRINT AT
 14,24;"        ";AT 15,24;"
   ";AT 16,24;"        ": LET cm
=1: LET aa=200: RETURN
 398 IF INKEY$="y" THEN PRINT AT
 14,24;"        ";AT 15,24;"
```

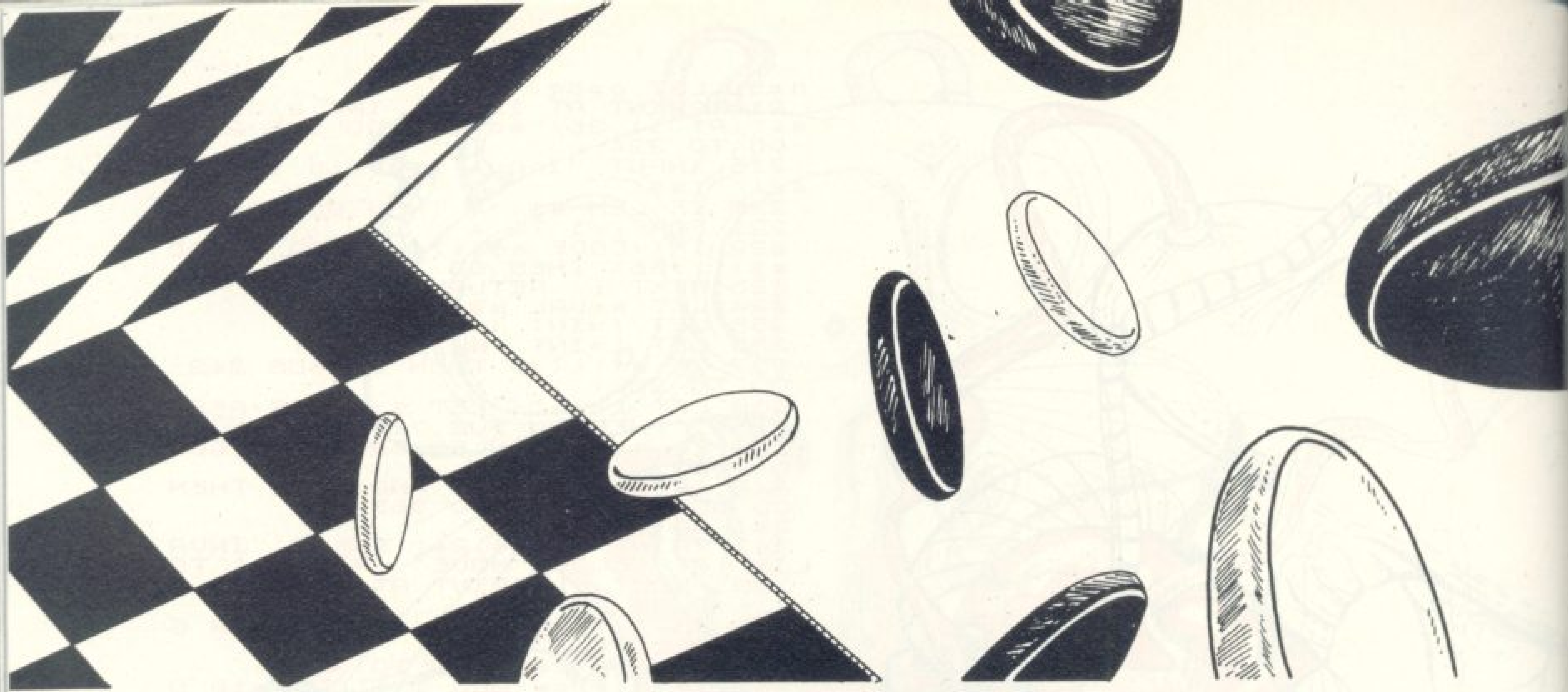
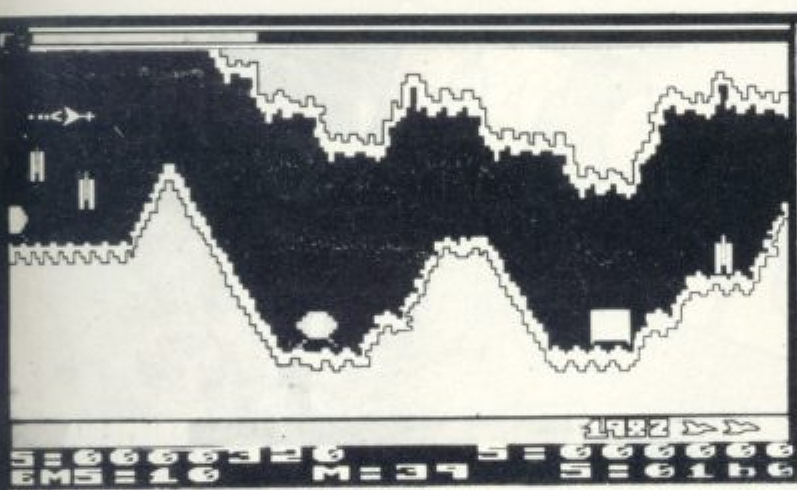


Illustration: Dorian Cross

```
 ";AT 16,24;"            ": LET aa
=410: RETURN
 399 GO TO 395
 410 PRINT AT 10,25; INK 2;"Gree
ns";AT 11,26;"move"
 415 LET z=0: LET aa=0: LET q=0:
 LET e=0: LET s=0: LET p=1: LET
n=w: LET o=wq
 420 GO SUB 215
 425 LET g=VAL m$
 431 LET f=INT (g/100)
 432 LET t=INT (g-(f*100))
 435 IF a(t)<>0 THEN GO SUB 242:
 GO TO 410
 437 LET k=f-t: LET q=k: IF ABS
(k)>11 THEN GO SUB 700
 438 IF p=0 THEN GO SUB 242: GO
TO 410
 439 IF ABS (k)<12 AND cm=1 THEN
 GO SUB 860: GO TO 560
 440 IF a(f)=b OR a(f)=bq THEN G
O TO 446
 442 GO SUB 242: GO TO 410
 446 IF a(f)=b AND q>-9 OR q=-10
 OR q<-22 OR q=1 THEN GO SUB 242
: GO TO 410
 450 IF a(f)=bq THEN LET e=1: GO
 TO 470
 460 LET a(f)=0: LET a(t)=b: GO
SUB 300: GO TO 492
 470 LET a(f)=0: LET a(t)=bq: GO
 SUB 300
 492 IF q=18 OR q=-18 OR q=22 OR
 q=-22 THEN LET d=d+1: PRINT AT
2,24;d
 494 IF t=80 OR t=82 OR t=84 OR
t=86 THEN LET a(t)=bq
 500 GO SUB 335
 515 IF ABS (k)>11 THEN GO TO 53
0
 516 GO SUB 520
 518 GO TO 560
 520 IF a(t)=b THEN PRINT AT tx,
ty; PAPER 4; INK 1;"■";AT tx+1,
ty;"■"
 522 IF a(t)=bq THEN PRINT AT tx
,ty; PAPER 4; INK 1;"■";AT tx+1
,ty;"■"
 525 RETURN
 530 GO SUB 520
 540 GO SUB 355
 555 IF q=18 OR q=-18 OR q=22 OR
 q=-22 THEN GO SUB 395
 557 IF aa=200 THEN GO TO 410
 560 LET cm=0: LET q=0: IF d=12
THEN GO TO 820
 565 GO TO 200
 600 DIM a(99)
 601 LET b=-1: LET w=1: LET wq=2
: LET bq=3
 605 LET h=11: LET l=17
 610 FOR c=h TO l STEP 2
 615 LET a(c)=b
 620 NEXT c
 625 IF l=17 THEN LET h=20: LET
l=26: GO TO 610
 630 IF l=26 THEN LET h=31: LET
l=37: GO TO 610
 635 LET h=60: LET l=66
 640 FOR c=h TO l STEP 2
 645 LET a(c)=w
 650 NEXT c
 655 IF l=66 THEN LET h=71: LET
l=77: GO TO 640
 660 IF l=77 THEN LET h=80: LET
l=86: GO TO 640
 665 RETURN
 700 IF k=-18 AND (a((t)-9)=n OR
 a((t)-9)=o) THEN RETURN
 702 IF k=-22 AND (a((t)-11)=n O
R a((t)-11)=o) THEN RETURN
 704 IF k=18 AND (a((f)-9)=n OR
a((f)-9)=o) THEN RETURN
 706 IF k=22 AND (a((f)-11)=n OR
 a((f)-11)=o) THEN RETURN
 708 LET p=0: RETURN
 800 PRINT AT 10,25; INK 3;"WHIT
E "
 802 GO SUB 805
 803 GO TO 830
 805 PRINT AT 11,25; INK 3;"WINS
 ";AT 13,23;"ANOTHER";AT 14,23;"
GAME ?"
 820 PRINT AT 10,25; INK 3;"GREE
N "
 825 GO SUB 805
 830 INPUT g$
 835 IF g$(1)="n" THEN CLS : LIS
T
 840 CLS : CLEAR : RUN 2
 850 STOP
 860 PRINT AT 13,26; INK 2; BRIG
HT 1;"DON,T";AT 14,25;"CHEAT": F
OR v=1 TO 100: NEXT v: BRIGHT 0:
 PRINT AT 13,26;"      ";AT 14,25
;"       ": RETURN
 900 LET ab=BIN 11111111: LET ac
=BIN 11111100: LET ad=BIN 111110
00: LET ae=BIN 11110000: LET af=
BIN 11100000
 901 LET ag=BIN 01111111: LET ah
=BIN 00111111: LET ai=BIN 000111
11: LET aj=BIN 00001111: LET ak=
BIN 00000111
 902 LET ba=ab: LET bb=BIN 11111
110: LET al=bb: LET bc=ac: LET b
d=BIN 11111001: LET be=BIN 11110
010: LET bf=BIN 11100100
 903 LET bg=ag: LET bh=ah: LET b
i=BIN 10011111: : LET bj=BIN 0100
1111: LET bk=BIN 00100111
 910 FOR v=144 TO 151
 915 FOR d=0 TO 7
 920 READ a: POKE USR CHR$ (v)+d
,a
 925 NEXT d: NEXT v: RETURN
 930 DATA ab,ab,ab,al,ac,ad,ae,a
f
 935 DATA ab,ab,ab,ag,ah,ai,aj,a
k
 940 DATA ak,aj,ai,ah,ag,ab,ab,a
b
 945 DATA af,ae,ad,ac,al,ab,ab,a
b
 950 DATA ba,ba,ba,bb,bc,bd,be,b
f
 955 DATA ba,ba,ba,bg,bh,bi,bj,b
k
 960 DATA bk,bj,bi,bh,bg,ba,ba,b
a
 965 DATA bf,be,bd,bc,bb,ba,ba,b
a
```



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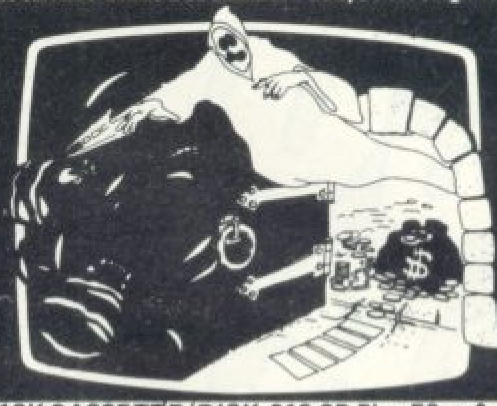
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CODE BREAKER II



Can you crack the hidden code? It can be set by the computer or by an opponent. The code is set by using numbers between 0 and 9. Clues to the code are shown at the end of each line as you attempt to crack it.

Once you have entered the numbers you wish to try press the space key. This will give you the clues. After entering the numbers and before checking the answer you can delete the line and start again by pressing the E key.

RUNS ON A PET IN 8K

BY GRAHAM JONES

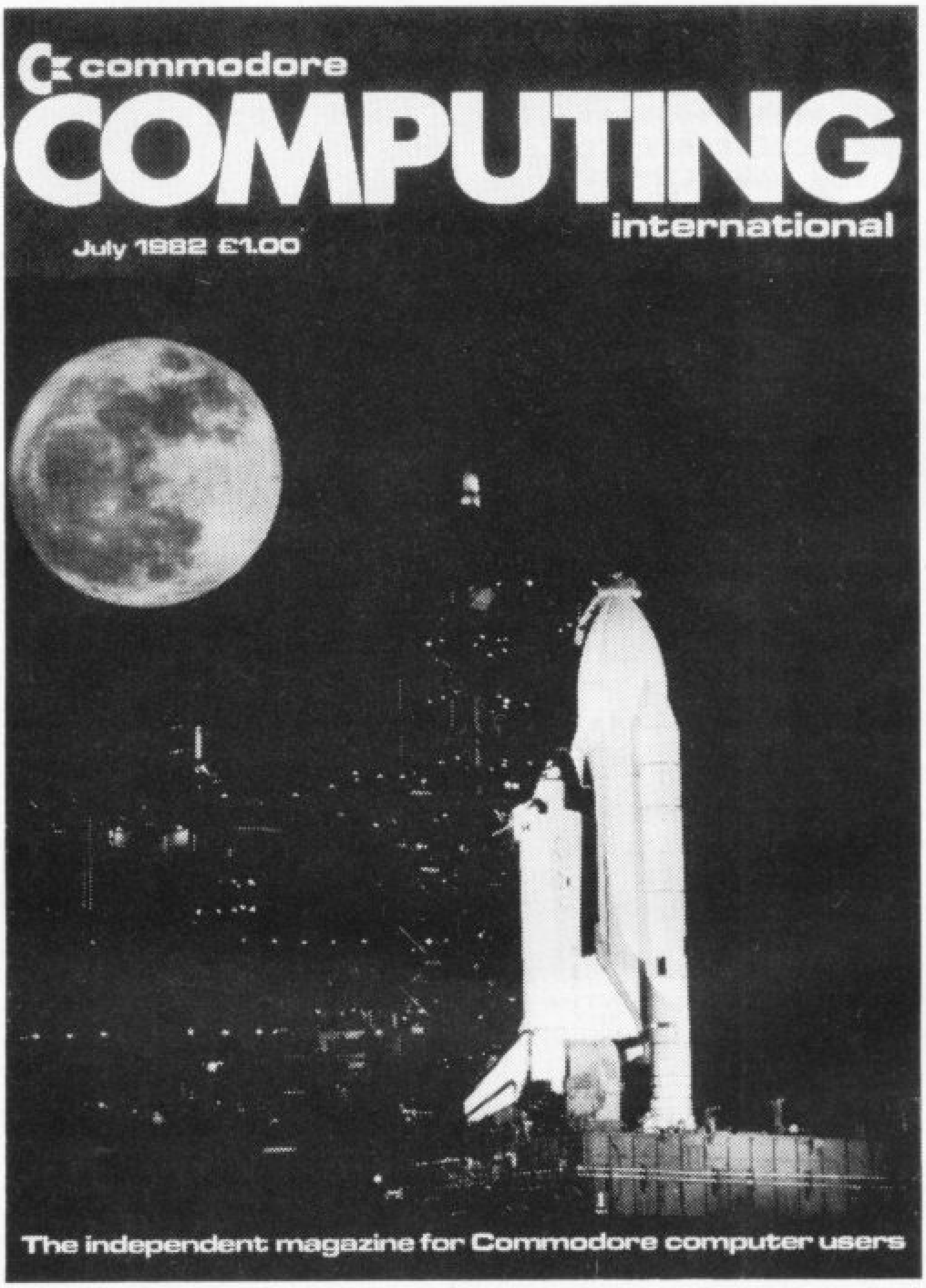
```
0 REM***CODEBREAKER 2 BY G.S.JONES***
1 PRINT"3":GOTO7
5 GETA$:IFA$=""THEN5
6 RETURN
7 FORI=1TO9:READM$(I):NEXT
8 DATA"A","B","C","D","E","F","G","H","I"
10 PRINTTAB(12)"                  "
15 PRINTTAB(12)" codebreaker "
20 PRINTTAB(12)"                  "
25 POKE59468,14:PRINT"tHE OBJECT OF THE GAME IS TO BREAK"
```

Illustration: Dorian Cross

```
30 PRINT"A HIDDEN CODE. tHIS CAN BE SET BY"
35 PRINT"AN OPPONENT IN THE 2 PLAYER GAME OR"
40 PRINT"BY THE pet IN THE ONE PLAYER GAME."
45 PRINT"tHE CODE IS SET BY THE USE OF THE"
50 PRINT"NUMBERS BETWEEN 0 AND 9 AND AT THE"
55 PRINT"END OF EACH LINE THE CLUES ARE SHOWN"
60 PRINT"E.G.":PRINT"hIDDEN CODE         aNSWER    cLUES"
65 PRINT"  2 3 3 5          2 3 4 3    2 1"
70 PRINT"  2 3 3 5          2 3 1 0    2 0"
75 PRINT"  2 3 3 5          2 3 3 6    3 0"
80 PRINT"  2 3 3 5          2 3 3 5    4 0"
85 PRINT"$$$$$$$$$$$$$$$$$$$$$$$$$$$":PRINT" PRESS ANY KEY TO CONTINUE "
95 PRINT"£££££££££££££££££££££££££££":GOSUB5
100 PRINT"3oNCE YOU HAVE ENTERED THE NUMBERS"
105 PRINT"YOU WISH TO TRY PRESS <space> THIS"
110 PRINT"WILL GIVE YOU THE ANSWER CLUES"
112 PRINT" aFTER ENTERING THE NUMBERS AND"
114 PRINT"BEFORE CHECKING THE ANSWER YOU"
116 PRINT"MAY DELETE THE LINE AND START"
118 PRINT"AGAIN BY PRESSING THE LETTER <e>"
120 PRINT"$$$$$$$$$$$$$$$$$$$$$$$$":PRINT" PRESS ANY KEY TO START "
124 PRINT"££££££££££££££££££££££££":GOSUB5
126 REM**SET PLAYERS**
128 POKE59468,12:PRINT"3 ONE PLAYER OR TWO (1 OR 2)"
129 GOSUB5:IFVAL(A$)<1ORVAL(A$)>2THEN129
130 IFVAL(A$)=2THEN175
133 REM**ONE PLAYER SET**
135 PRINT"3 ONE PLAYER GAME":GOSUB2400
140 PRINT" THE PET WILL NOW SET A CODE"
150 FORJ=1TO1000:NEXT:P=1:FORN=1TOT:A(N)=INT(10*RND(1)):NEXT
160 GOSUB2000:GOTO1000
175 REM**TWO PLAYER SET**
180 H=1:X=2:B=0:Z=0:C=0:V=0
185 FORN=1TOT:A(N)=0:NEXT:P=2
190 PRINT"3 TWO PLAYER GAME":GOSUB2400
195 PRINT"HOW MANY ROUNDS (1 TO 8) ?";
200 GOSUB5:IFVAL(A$)<1ORVAL(A$)>8THEN200
205 U=VAL(A$):PRINTU:Z=U*2
210 PRINT"3PLAYER"H"SET CODE"
215 PRINTTAB(5):FORI=1TOT:PRINTM$(I)"    ";:NEXT:PRINT
225 PRINTTAB(4)"";:FORN=1TOT:GOSUB5:A(N)=VAL(A$)::PRINTA(N)" ";:NEXT
250 FORN=1TO1000:NEXT:GOSUB2000
1000 REM**PLAY GAME**
1005 L=0:LL=0
1010 IFP=2THENPRINT""TAB(19+T)"PLAYER"X
1012 PRINT"":IFLL>9THENPRINT""
1015 W=0:R=0
1020 PRINTTAB(Q);:FORN=1TOT:GOSUB5:E(N)=VAL(A$):PRINTE(N)"===}";:NEXT:GOSUB5
1025 IFA$<>"E"THEN1035
1030 PRINT:PRINTTAB(Q)"1";:FORI=1TOT:PRINT"  ";:NEXTI:PRINT"1":GOTO1015
1035 GOSUB2500:PRINT""R"===}"W"===}"
1040 L=L+1:IFR=TTHEN1065
1045 IFL<10THEN1015
1050 LL=LL+L:GOSUB2300:GOSUB2000
1055 PRINT""TAB(Q);:FORN=1TOT:PRINTE(N)"===}";:NEXT:PRINT"}";
1060 PRINTR"===}"W"===}":L=1:GOTO1010
1065 PRINT""TAB(Q):FORI=1TOT:PRINTA(I)"===}";:NEXT:PRINT" CONGRATULATIONS"
1070 IFP=2THEN1085
1075 O=L+LL:FORN=1TO5000:NEXT
1080 PRINT"3YOU MADE"O"MOVES":GOTO2350
1085 IFH=2GOTO1095
1090 V=V+L+LL:H=2:X=1:GOTO1100
1095 C=C+L+LL:H=1:X=2
1100 FORN=1TO5000:NEXT:B=B+1:IFB<ZTHEN210
1105 PRINT"3"TAB(6)"PLAYER 1"TAB(26)"PLAYER 2"
1110 PRINTTAB(8)CTAB(29)V
1115 IFV>CTHENPRINT"PLAYER 1 IS THE WINNER"
```

Illustration: Dorian Cross

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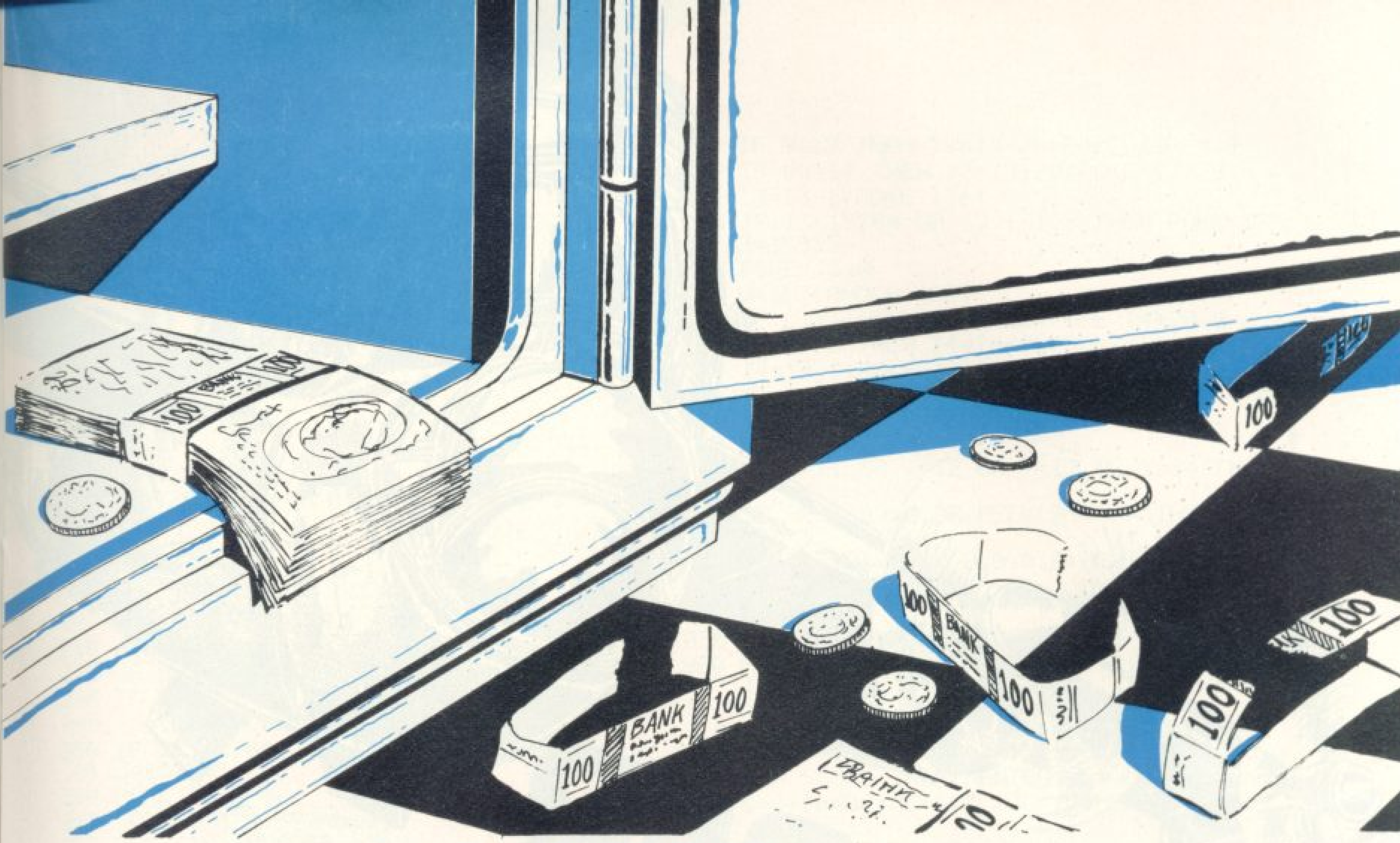
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```
1120 IFV<CTHENPRINT"PLAYER 2 IS THE WINNER"
1125 IFV=CTHENPRINT"IT'S A DRAW"
1130 GOTO2350
2000 REM**DRAW BOARD**
2005 PRINT"3":PRINTTAB(Q)"O";:FORI=1TOT:PRINT"'2";:NEXT:PRINT"=."
2010 PRINTTAB(Q)"}";:FORI=1TOT:PRINT"?}";:NEXT:PRINT"=}"
2015 PRINTTAB(Q)"-";:FORI=1TOT:PRINT"'1";:NEXT:PRINT"==  / X"
2020 PRINTTAB(Q)"O";:FORI=1TOT:PRINT"'2";:NEXT:PRINT"=. O'2'."
2025 FORJ=1TO10:PRINTTAB(Q)"}";:FORI=1TOT:PRINT" }";:NEXTI:PRINT" } } }"
2030 PRINTTAB(Q)"+";:FORI=1TOT:PRINT"'{";:NEXTI:PRINT"=3 +'{'3":NEXTJ
2035 PRINTTAB(Q)"1-";:FORI=1TOT:PRINT"'1";:NEXT:PRINT"== -'1'="
2040 PRINT""TAB(23+T)"C=O=D=E=B=R=E=A=K=E=R":RETURN
2300 REM**QUESTION TIME**
2305 PRINT"3 DO YOU GIVE UP (Y OR N) ?":IFP=1GOTO2315
2310 PRINT"(IF YOU GIVE UP YOUR <TOTAL> SCORE IS   DOUBLED AS A PENALTY)"
2315 GOSUB5:IFA$="N"THENRETURN
2320 IFA$<>"Y"THEN2315
2325 PRINT"THE ANSWER IS:-"
2330 PRINTTAB(4);:FORI=1TOT:PRINTM$(I)"   ";:NEXT
2335 PRINT:PRINTTAB(3)"";:FORI=1TOT:PRINTA(I)" ";:NEXT:PRINT
2340 IFP=2GOTO1085
2350 PRINT"DO YOU WANT ANOTHER GAME (Y OR N)":GOSUB5:IFA$="Y"THEN128
2355 PRINT"THANKS FOR PLAYING":END
2400 PRINT"YOU CAN SET A CODE BETWEEN 3 AND 9"
2405 PRINT"NUMBERS IN LENGTH":PRINT"WHAT SIZE CODE DO YOU WISH TO TRY ?";
2410 GOSUB5:IFVAL(A$)<3ORVAL(A$)>9THEN2410
2415 T=VAL(A$):PRINTT:Q=(13-T):RETURN
2500 REM**COMPARITOR ROUTINE**
2505 FORK=1TOT:F(K)=0:G(K)=0:NEXT
2510 R=0:W=0:FORI=1TOT
2515 IFE(I)<>A(I)THEN2525
2520 F(I)=1:G(I)=1:R=R+1
2525 NEXTI:FORI=1TOT:IFG(I)=1GOTO2545
2530 FORJ=1TOT:IFA(I)<>E(J)ORF(J)=1GOTO2540
2535 F(J)=1:W=W+1:J=T
2540 NEXTJ
2545 NEXTI
2550 RETURN
READY.
```

Illustration: Dorian Cross



Illustration: Dorian Cross

BOMBER

RUNS ON AN ATARI 400 IN 6K

WITH JOYSTICKS

Beware the bouncing bombs! They'll get you given half a chance. And contact with one of these hopping horrors is decidedly lethal.

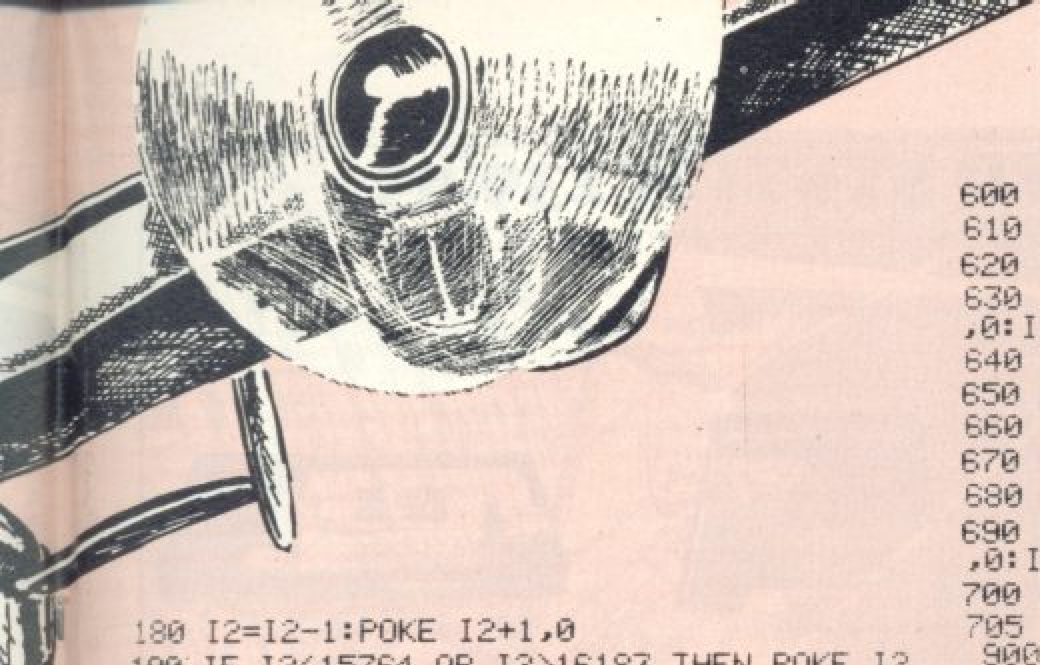
But you can protect yourself with a blast from your cannon which destroys the bobbing bombs.

Your cannon is situated on the right hand side of the Atari screen and the bombs bounce at you across the screen from the left. You control the firing base using a joystick.

So keep ducking and weaving — and stay alive!

BY JOHN BRIERLY

```
1 PRINT " ":POKE 752,1
2 SETCOLOR 2,0,0:POSITION 10,12:PRINT"TO
PLAY,PRESS 'START' "
3 IF PEEK(53279)=6 THEN 5
4 GOTO 3
5 A=202:LI=5:S=0
7 REM INITIALISE ALL VARIABLES
8 REM J,J1 etc. CHANGE WHEN AN INVADER I
S HIT AND CAUSE ITS RE-PLOTTING TO  BE B
YPASSED
10 GRAPHICS 1+16:B=15965
20 I1=15983:I2=15943:I3=15923:I4=16003:J
=90:J1=150:J2=210:J3=270:J4=460:J5=520:J
6=590:J7=650
30 POKE B,30:POKE B+1,141:POSITION 0,0:P
RINT #6;"score=";S:POSITION 18,0:PRINT #
6;LI:IF LI<1 THEN GOSUB 2000
31 IF S>Z+99 THEN A=A+64:Z=Z+100:REM CHA
NGE COLOUR OF INVADERS
32 IF A>202 THEN A=10
34 REM JOYSTICK CHECK
35 IF STRIG(0)=0 THEN 400
40 JS=STICK(0)
50 IF JS=14 THEN B=B-40:POKE B+40,0:POKE
 B+41,0
60 IF JS=13 THEN B=B+40:POKE B-40,0:POKE
 B-39,0
65 REM CHECK FOR BASE OUT OF RANGE OF SC
REEN
70 IF B<15745 THEN B=15745
80 IF B>16205 THEN B=16205
85 GOTO J
87 REM 1ST.INVADER
90 R=INT(RND(0)*20)
100 IF R<3 THEN I1=I1-20:POKE I1+20,0
110 IF R>=3 THEN I1=I1+20:POKE I1-20,0
120 I1=I1-1:POKE I1+1,0
125 REM CHECK FOR INVADER OUT OF RANGE A
ND RESET IF NEEDED (SAME FOR ALL THE INV
ADERS)
130 IF I1<15764 OR I1>16183 THEN POKE I1
,0:I1=15983
140 POKE I1,A
145 GOTO J1
147 REM 2ND.INVADER
150 I=INT(RND(0)*20)
160 IF I<17 THEN I2=I2-20:POKE I2+20,0
170 IF I>=17 THEN I2=I2+20:POKE I2-20,0
```



```
180 I2=I2-1:POKE I2+1,0
190 IF I2<15764 OR I2>16183 THEN POKE I2
,0:I2=15983
200 POKE I2,A
203 POKE B,30:POKE B+1,141
205 GOTO J2
207 REM 3RD.INVADER
210 G=INT(RND(0)*20)
220 IF G<3 THEN I3=I3-20:POKE I3+20,0
230 IF G>=3 THEN I3=I3+20:POKE I3-20,0
240 I3=I3-1:POKE I3+1,0
250 IF I3<15764 OR I3>16183 THEN POKE I3
,0:I3=15983
260 POKE I3,A
265 GOTO J3
267 REM 4TH.INVADER
270 Q=INT(RND(0)*20)
280 IF Q<17 THEN I4=I4-20:POKE I4+20,0
290 IF Q>=17 THEN I4=I4+20:POKE I4-20,0
300 I4=I4-1:POKE I4+1,0
310 IF I4<15764 OR I4>16183 THEN POKE I4
,0:I4=15983
320 POKE I4,A
325 REM CHECK FOR COLLISION BETWEEN INVA
DERS AND BASE
330 IF PEEK(B)=A OR PEEK(B+1)=A THEN GOS
UB 1000
380 GOTO 30
390 REM FIRING SECTION(BASICALLY 1ST. HA
LF REPEATED)
400 FOR T=B+2 TO B+17:POKE T,71:POKE T-1
,0:SOUND 0,10,8,4
410 JS=STICK(0)
420 IF JS=14 THEN B=B-40:POKE B+40,0:POK
E B+41,0
430 IF JS=13 THEN B=B+40:POKE B-40,0:POK
E B-39,0
440 IF B<15745 THEN B=15745
450 IF B>16205 THEN B=16205
455 GOTO J4
460 R=INT(RND(0)*20)
470 IF R<17 THEN I1=I1-20:POKE I1+20,0
480 IF R>=17 THEN I1=I1+20:POKE I1-20,0
490 I1=I1-1:POKE I1+1,0
500 IF I1<15764 OR I1>16183 THEN POKE I1
,0:I1=15983
510 POKE I1,A
515 GOTO J5
520 I=INT(RND(0)*20)
530 IF I<3 THEN I2=I2-20:POKE I2+20,0
540 IF I>=3 THEN I2=I2+20:POKE I2-20,0
550 I2=I2-1:POKE I2+1,0
560 IF I2<15764 OR I2>16183 THEN POKE I2
,0:I2=15983
570 POKE I2,A
575 POKE B,30:POKE B+1,141
580 GOTO J6
590 G=INT(RND(0)*20)
600 IF G<17 THEN I3=I3-20:POKE I3+20,0
610 IF G>=17 THEN I3=I3+20:POKE I3-20,0
620 I3=I3-1:POKE I3+1,0
630 IF I3<15764 OR I3>16183 THEN POKE I3
,0:I3=15983
640 POKE I3,A
650 Q=INT(RND(0)*20)
660 IF Q<3 THEN I4=I4-20:POKE I4+20,0
670 IF Q>=3 THEN I4=I4+20:POKE I4-20,0
680 I4=I4-1:POKE I4+1,0
690 IF I4<15764 OR I4>16183 THEN POKE I4
,0:I4=15983
700 POKE I4,A
705 IF T=I1 OR T=I2 OR T=I3 OR T=I4 THEN
 900
707 IF PEEK(B)=A OR PEEK(B+1)=A THEN GOS
UB 1000
710 POKE T,0:SOUND 0,0,0,0:NEXT T
720 REM CYCLE AROUND
800 GOTO 30
850 REM HIT INVADER SUBROUTINE
900 FOR Y=1 TO 50:SOUND 0,Y,12,10:SOUND
1,Y,10,10:POKE T-1,158:POKE T,29:POKE T+
1,156:NEXT Y:POKE T-1,0:POKE T+1,0
910 POKE I1,0:POKE I2,0:POKE I3,0:POKE I
4,0:I1=15983:I2=15943:I3=15923:I4=16003
915 REM SCORE INCREMENTED:JC=JUMP CHECK
920 S=S+10:JC=JC+1:IF JC=1 THEN J=145:J4
=515
925 IF JC=2 THEN J1=203:J5=575
930 IF JC=3 THEN J2=265:J6=650
935 REM IF 4TH.INVADER HAS BEEN HIT,  GO
TO 'NEW SET SUBROUTINE'
940 IF JC=4 THEN GOSUB 3000
945 REM CYCLE AROUND------------
950 SOUND 0,0,0,0:SOUND 1,0,0,0:GOTO 30
960 REM SUBROUTINE FOR A BASE HIT
1000 FOR Y=80 TO 1 STEP -1:SOUND 0,Y,12,
10:SOUND 1,Y,10,10
1005 POKE B,94:POKE B+1,75:POKE B+2,195:
POKE B+3,75:POKE B+4,92
1010 SOUND 0,Y,12,10:SOUND 1,Y,12,10:NEX
T Y
1015 POKE I1,0:POKE I2,0:POKE I3,0:POKE
I4,0:POKE B+2,0:POKE B+3,0:POKE B+4,0
1020 SOUND 0,0,0,0:SOUND 1,0,0,0
1025 REM LOSE 1 LIFE BUT GAIN 5 POINTS
1030 LI=LI-1:S=S+5:I1=15983:I2=15943:I3=
15923:I4=16003
1050 RETURN
1060 REM 'GAME OVER SUBROUTINE'
2000 GRAPHICS 2:SETCOLOR 2,0,0:FOR H=1 T
O 100:SOUND 0,H,8,10:SOUND 1,H,12,10
2010 POSITION 5,4:PRINT #6;"game over!":
POSITION 1,6:PRINT #6;"YOUR SCORE WAS ";
S
2020 NEXT H
2030 PRINT "PRESS 'START' TO PLAY AGAIN"
2035 SOUND 0,0,0,0:SOUND 1,0,0,0
2037 REM CHECK FOR PRESSING 'START':7=NO
THING PRESSED:6='START':5='SELECT':3='OP
TION'
2040 IF PEEK(53279)=6 THEN 5
2050 GOTO 2040
3000 FOR K=1 TO 5
3010 FOR N=80 TO 7 STEP -2:SOUND 0,N,12,
10:SOUND 1,N,8,10:NEXT N
3020 FOR L=1 TO 30:NEXT L
3040 NEXT K
3050 JC=0:J=90:J1=150:J2=210:J3=270:J4=4
60:J5=520:J6=590
3060 RETURN
```

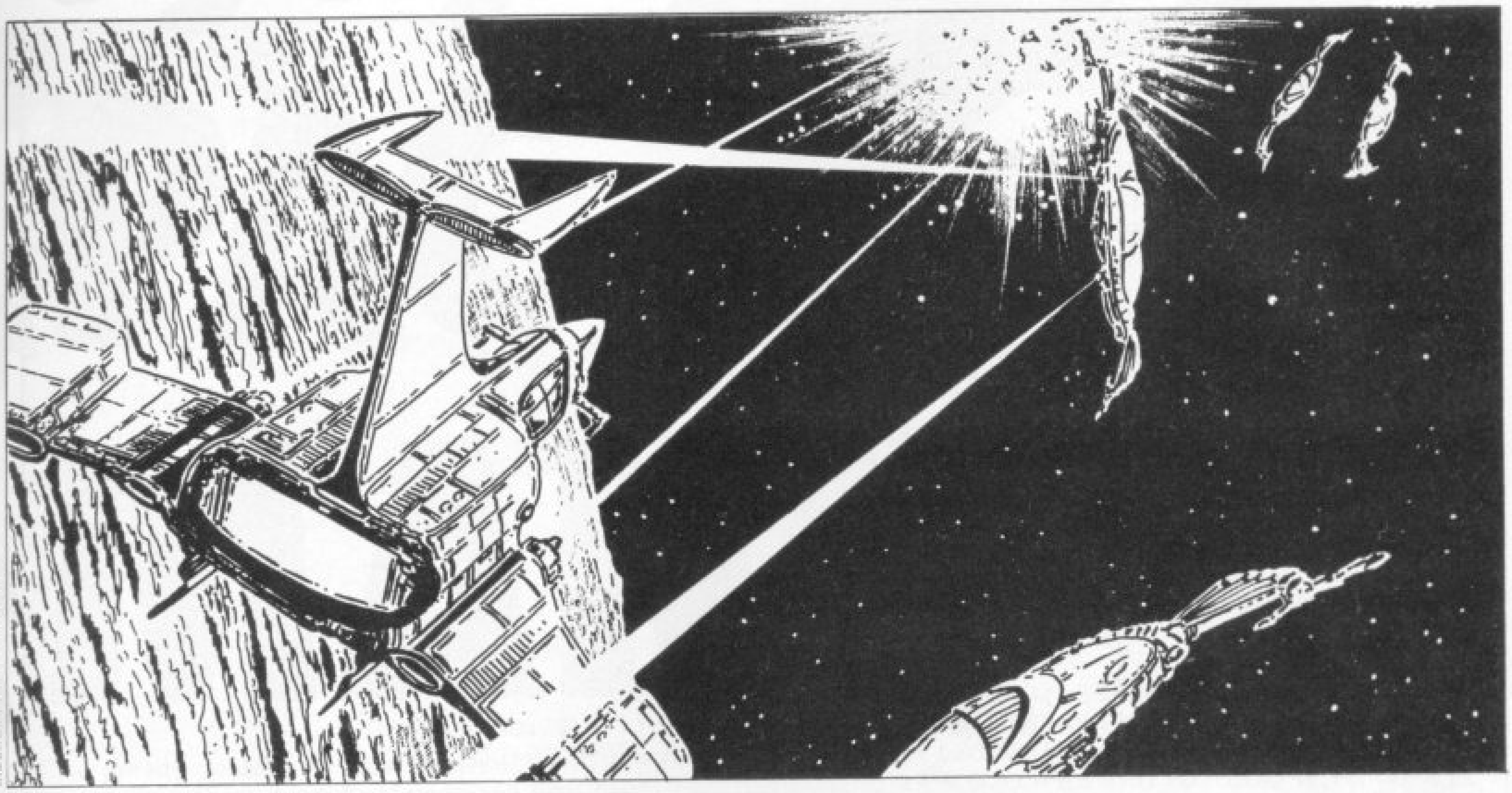


Illustration: Dorian Cross

MINI DEFENDER

RUNS ON A ZX81 IN 1K BY SIMON WEBB

Let some arcade aliens run riot around your ZX81 and program in this special 1K version of a top video game.

The program is started, either automatically on LOADing, or by using, GOTO 60. Your score will appear at the top of the screen. This is updated after every wave.

At the bottom of the screen a display will tell you which wave you are passing through; the ehemy ships attack in a total of eight waves.

Variables are: X: The height of the ship, controlled by the "7" key. Y: The height of the enemy ship, randomly chosen. S: The current score, depending on how many enemy ships you hit, and which wave you are in. A: This defines which part of the strings, AS and BS are printed. C: This has a fixed value of 1. D: This has a fixed value of 0. F: This has a fixed value of 6. CS: This is simply a blank space, used for wiping out your ship, and for comparisons.

```
  10 PRINT AT X,C;"        "
  20 IF X<>Y THEN RETURN
  30 LET S=S+(10-E)*(B$(E)<>C$)
  40 SGN B$(E)=C$
  50 RETURN
  60 LET S=D
  70 FOR E=9 TO 2 STEP -CQ ?INKE
Y$ PRINT AT D,D;" SCORE     ";AT
 D,F+C;S;AT F+C,D;"  WAVE  ";CHR$
 (166-E);"  "
  90 FOR B=C TO 20
 100 DIM B$(18)
 110 LET B$(E)=CHR$ (E+14)
 120 LET Y=INT (RND*5)+C
 130 FOR A=C TO C+E
 140 PRINT AT Y,C;B$(A TO A+8);A
T X,D;C$;AT F,D;A$(A TO A+9)
 150 LET X=X+(INKEY$="" AND X<5)
-(INKEY$="7" AND X>C)
 160 PRINT AT X,D;">"
 170 IF INKEY$="0" THEN GOSUB 10
 180 NEXT A
 190 IF X=Y AND B$(E)<>C$ THEN G
OTO 220
 200 PEEK B
 210 NEXT E
 220 PRINT AT D,F;S
 999 STOP
1000 SAVE "DEF"
1010 GOTO 60
```

At the left of the screen you will see your ship. This will automatically move down and can be moved up by pressing the "7" key.

The enemy ships will appear from the right of the screen, and will start from a point closer to you each time a new wave is started.

When you are vertically aligned with the enemy ship, press "0" to fire. The ship will then disappear, and your score will be incremented.

If an enemy ship hits you, your score will be displayed, and the program will stop with a report of 9/999. To restart use GOTO 60.

The maximum possible score is 720.

Lines 10 to 50 are the fire subroutine. If your ship is not vertically aligned with the enemy, then the program RETURN's to the main loop (20), otherwise your score is calculated (30), and the enemy ship is blanked (40).

The start of the program (60), sets the score to zero, and starts the variable, E, which determines which "wave" you go through (70).

Line 80 prints the top and bottom borders, along with your current score.

The variable, Y, which is the height at which the enemy appears is set up in line 120.

Line 150 controls the height of your ship (the variable X), and line 160 prints your ship at this position.

Line 220 prints your final score, and then stops at 999.

Lines 1000 and 1010 are a save routine, which ensures that the program starts at line 60 and is not RUN. The program must be started in this way, because several variables are entered directly, to conserve memory.

To start the program use GOTO 60 not RUN.

IMPORTANT: Before the program will run correctly you will have to key in these lines directly. LET C = 1. LET D = 0. LET F = 6. LET X = 3. LET C$ = "one space". LET A$ = (graphics of) "QW863684Q6QW863684Q".

```
10 PRINT"":POKE36879,27:REM TITLE AND CREDITS
20 PRINT"**MINI-PACK**"
30 PRINT"FOR"
40 PRINT"THE"
50 PRINT"VIC20"
60 PRINT"BY DAVID MACK"
70 PRINT"FARNBOROUGH"
80 FORI=1TO2000:NEXTI
85 S1=1:S2=-1:S3=22:S4=-22:RS=160:GH=102:PM=87:D1=46:G1=94
90 TL=200:K1=56:K2=57:K3=58:K4=59:D2=90:CD=30720
100 INPUT"INSTRUCTIONS(Y/N)";A$
110 IFA$="Y"THENGOSUB2000
115 T=0:S=0:P=8064:GOSUB1000
120 G=7680+INT(RND(1)*424)+40:POKE36878,15:DN=36876
125 IFPEEK(G)<>D1THENG=G-1:T=T+1:IFT>5THENG=7734:GOTO125
130 TI$="000000":POKEG,G1:POKEG+CD,0
140 D=INT(RND(1)*4)+1
150 M=PEEK(197)
160 IFD=4THENC=S1
170 IFD=2THENC=S2
180 IFD=3THENC=S3
190 IFD=1THENC=S4
200 IFPEEK(G+C)=RSORPEEK(G+C)=GHTHEN140
205 IFPEEK(G+C)=PMTHENPRINT"THE GHOST GOT YOU!!  ":GOTO2500
210 POKEG,D1:POKEG+CD,4:IFRND(1)<.05THENPOKEG,D2:POKEG+CD,2
215 G=G+C:POKEG,G1:POKEG+CD,0:F=1
220 IFF=1THEN235
230 GOTO200
235 GOTO300
236 IFRND(1)<.25THEN140
240 IFVAL(TI$)>TLTHENPRINT"TIME UP              ":GOTO3000
250 GOTO200
300 REM YOUR MOVE+SCORE
310 POKEP,PM:POKEP+CD,5
320 M=PEEK(197)
330 IFM=K1THENX=S2
335 IFM=K2THENX=S1
340 IFM=K3THENX=S4
345 IFM=K4THENX=S3
350 IFPEEK(P+X)=RSORPEEK(P+X)=GHTHEN380
355 IFPEEK(P+X)=D1THENS=S+10:Z=1
356 IFPEEK(P+X)=94THENPRINT"THE GHOST GOT YOU!!  ":GOTO2500
360 IFPEEK(P+X)=D2THENS=S+100:Z=1
365 POKEP,32:P=P+X
370 POKEP,PM:POKEP+CD,5:F=0
375 IFZ=1THEN POKEDN,220:FORI=1TO8:NEXTI:POKEDN,0:Z=0
380 PRINT""S:PRINT"TIME="RIGHT$(TI$,3)
400 GOTO236
1000 REM SET UP MAZE
1010 PRINT""
1020 PRINT" ..................... "
1030 PRINT" . .  .  . . "
1040 PRINT" ..................... "
1050 PRINT" . . .  .  . . . "
1060 PRINT" . ............... . "
1070 PRINT" . . . .  .  . . . . "
1080 PRINT" . . ........... . . "
1090 PRINT" . . . . .  .  . . . . "
1100 PRINT" . . . . . ... . . . . . "
1110 PRINT" ......... ........ "
1120 PRINT" . . . . . ... . . . . . "
1130 PRINT" . . . .  .  . . . . "
1140 PRINT" . . ........... . . "
1150 PRINT" . . . .  .  . . . . "
1160 PRINT" . ............... . "
1170 PRINT" . . .  .  . . . "
1180 PRINT" ..................... "
1190 PRINT" . .  .  . . "
1200 PRINT" ..................... "
1210 PRINT"                      "
1220 PRINT"SCORE:-"S
1225 RETURN
2000 PRINT"     INSTRUCTIONS"
2010 PRINT"EAT THE DOTS AND THE"
```

PAC MAN



That greedy gobbler Pacman is getting everywhere these days. So if you can't beat him — well you know what comes next! Computer and Video Games has discovered this version of the arcade favourite for all you VIC-20 owners out there in microcomputer-land.

In this version a randomly moving ghost leaves a trail of dots — and sometimes diamonds — in its wake. Your Pac-Man chases it around a maze munching the dots — worth 10 points — and the diamonds — worth 100 points.

The player gets two minutes to eat as much as he can. To move the Pac-Man use keys 2 for left, 4 for right, 6 for up and 8 for down.

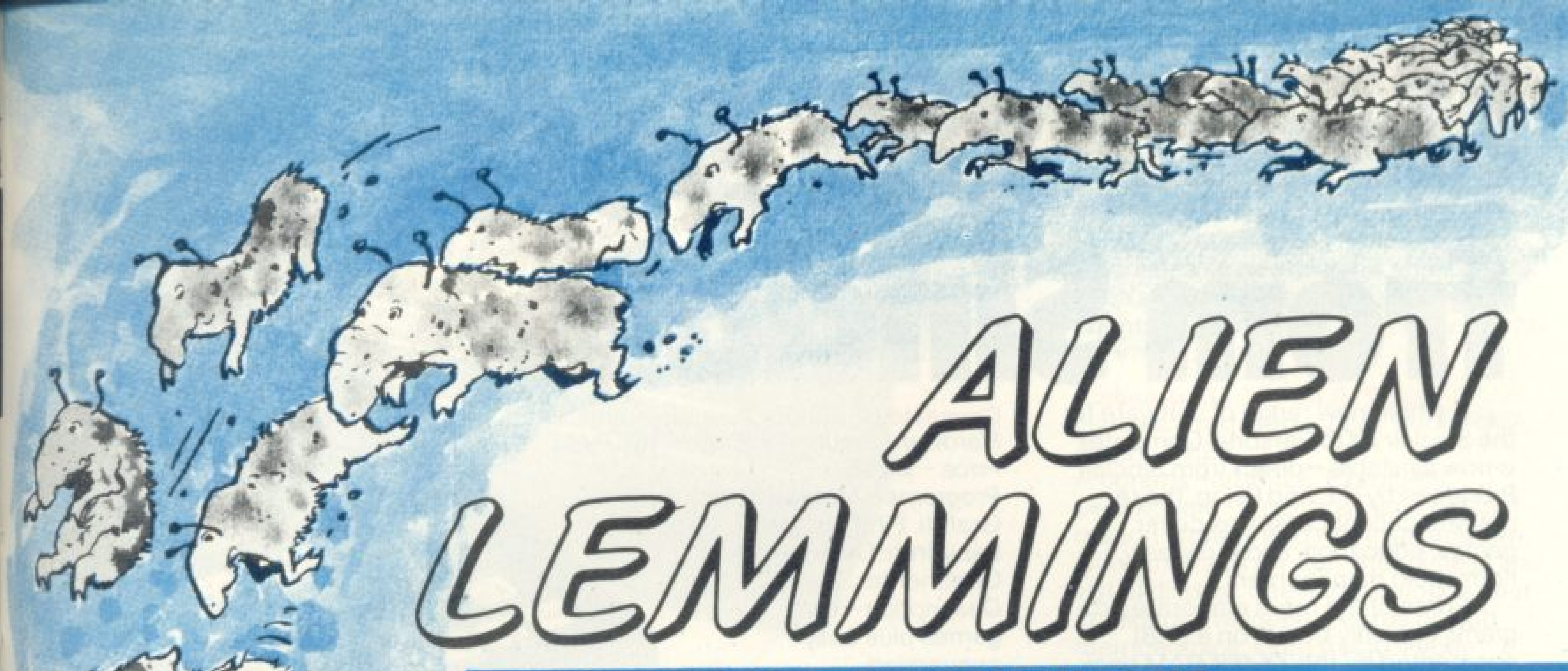
The Pac-Man appears at a different point within the maze at the start of each game and there is a high score facility. The author of Pacman, David Mack, says the record so far is 6520 in the two minutes allowed. Can you beat that?

RUNS ON A VIC-20 IN 3.5K

BY DAVID MACK

```
2020 PRINT"DIAMONDS TO SCORE AS"
2030 PRINT"MANY POINTS AS YOU CAN"
2040 PRINT"]IN TWO MINUTES."
2060 PRINT"▓WATCH OUT-THE GHOST"
2070 PRINT"WILL EAT YOU AND THE"
2080 PRINT"DIAMONDS."
2090 PRINT"▓MOVEMENT:-"
2100 PRINT"2-LEFT    4-RIGHT"
2110 PRINT"6-UP      8-DOWN"
2120 PRINT"▓GOOD LUCK"
2130 PRINT"▓PRESS A KEY"
2140 GETA$:IFA$=""THEN2140
2150 RETURN
2500 N=36875
2510 FORI=255TO128STEP-1
2520 POKEN,I
2525 FORZ=1TO5:NEXTZ
2530 NEXTI
2535 POKEN,0
3000 FORI=1TO500:NEXTI:PRINT"]▓"
3010 IFS>HSTHENHS=S
3015 PRINT"YOUR SCORE WAS"S
3020 IFS=HSTHENPRINT"▓A NEW HI-SCORE":POKE198,0:INPUT"▓WHAT IS YOUR NAME▓▓▓▓▓▓";A$
3030 PRINT"▓HI-SCORE="HS
3035 PRINT"▓BY "A$
3040 POKE198,0:INPUT"▓ANOTHER GAME(Y/N)";B$
3050 IFB$="Y"THEN 115
3055 PRINT"▓GOOD BYE.HOPE YOU"
3056 PRINT"▓ENJOYED PLAYING."
3060 END
```

Illustration: Jon Davis



ALIEN LEMMINGS



BY BOB PENROSE RUNS ON AN APPLE

Here they come — those loveable Alien Lemmings! They drop from the sky like furry hailstones. Can you catch them before they come to a sticky end?

Use your Apple paddles to move the bat which appears at the bottom of the screen to save the falling lemmings and bounce them back into the air. In order to win you have to keep those little lemmings bouncing.

The number of Alien Lemmings which drop from the sky depends on the skill level you chose — from one to five.

The program includes some good sound effects — including a nice victory tune should you manage to beat the lemmings.

So get programming and remember — Help Save the Alien Lemming!

```
1  REM
2  REM              *****************
3  REM                ALIEN LEMMINGS
4  REM                BY BOB PENROSE
5  REM                  FEB 1982
6  REM              *****************
7  REM
10  TEXT : HOME : CLEAR
20  GOSUB 1000: GOSUB 1500: GOSUB 1090
24  REM
25  REM              *******************
26  REM              CHECK CORRECT PADDLE
27  REM              *******************
28  REM
30  VTAB 23: HTAB 1: CALL  - 868: PRINT "PRESS PADDLE BUTTON TO BEGIN"
40 X =  PEEK ( - 16287): IF X > 127 THEN  VTAB 23: CALL  - 868: GOSUB 1600
   : GOTO 100
50 X =  PEEK ( - 16286): IF X > 127 THEN  VTAB 23: HTAB 1: CALL  - 868: INVERSE
   : PRINT "PLEASE USE OTHER PADDLE": NORMAL : FOR I = 1 TO 2000: NEXT :
   GOTO 30
54  REM
55  REM    ==="(P)ADDLE" CONTAINS 3 CTRL-G===
56  REM
60  GOTO 40
94  REM
95  REM              *******************
96  REM              MAIN LOOP OF PROGRAM
97  REM              *******************
98  REM
100  FOR I = 0 TO 8 STEP ST%
110  IF CH%(I) = 1 THEN 140
120  IF  RND (1) > R THEN CH%(I) = 1:X%(I) = 20 * (I + 2):Y%(I) = 70: GOTO
   150
130  GOTO 280
140  XDRAW 2 AT X%(I),YY%(I):Y%(I) = Y%(I) + V%(I)
```

Illustration: Jon Davis

New ZX81 Software from Sinclair.



A whole new range of software for the Sinclair ZX81 Personal Computer is now available – direct from Sinclair. Produced by ICL and Psion, these really excellent cassettes cover games, education, and business/household management.

Some of the more elaborate programs can only be run on a ZX81 augmented by the ZX 16K RAM pack. (The description of each cassette makes it clear what hardware is required.) The RAM pack provides 16-times more memory in one complete module, and simply plugs into the rear of a ZX81. And the price has just been dramatically reduced to only £29.95.

The Sinclair ZX Printer offer full alphanumerics and highly-sophisticated graphics. A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. So now you can print out your results for a permanent record. The ZX Printer plugs into the rear of your ZX81, and you can connect a RAM pack as well.

Games

Cassette G1: Super Programs 1 (ICL)
Hardware required – ZX81.
Price – £4.95.
Programs – Invasion from Jupiter. Skittles. Magic Square. Doodle. Kim. Liquid Capacity.
Description – Five games programs plus easy conversion between pints/gallons and litres.

Cassette G2: Super Programs 2 (ICL)
Hardware required – ZX81.
Price – £4.95.
Programs – Rings around Saturn. Secret Code. Mindboggling. Silhouette. Memory Test. Metric conversion.
Description – Five games plus easy conversion between inches/feet/yards and centimetres/metres.

Cassette G3: Super Programs 3 (ICL)
Hardware required – ZX81.
Price – £4.95.
Programs – Train Race. Challenge. Secret Message. Mind that Meteor. Character Doodle. Currency Conversion.
Description – Fives games plus currency conversion at will – for example, dollars to pounds.

Cassette G4: Super Programs 4 (ICL)
Hardware required – ZX81.
Price – £4.95.
Programs – Down Under. Submarines. Doodling with Graphics. The Invisible Invader. Reaction. Petrol.
Description – Five games plus easy conversion between miles per gallon and European fuel consumption figures.

Cassette G5: Super Programs 5 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £4.95.
Programs – Martian Knock Out. Graffiti. Find the Mate. Labyrinth. Drop a Brick. Continental.
Description – Five games plus easy conversion between English and continental dress sizes.

Cassette G6: Super Programs 6 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £4.95.
Programs – Galactic Invasion, Journey into Danger. Create. Nine Hole Golf. Solitaire. Daylight Robbery.
Description – Six games making full use of the ZX81's moving graphics capability.

Cassette G7: Super Programs 7 (ICL)
Hardware required – ZX81.
Price: – £4.95.
Programs – Racetrack. Chase. NIM. Tower of Hanoi. Docking the Spaceship. Golf.
Description – Six games including the fascinating Tower of Hanoi problem.

Cassette G8: Super Programs 8 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £4.95.
Programs – Star Trail (plus blank tape on side 2).
Description – Can you, as Captain Church of the UK spaceship Endeavour, rid the galaxy of the Klingon menace?

Cassette G9: Biorhythms (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – What are Biorhythms? Your Biohythms.
Description – When will you be at your peak (and trough) physically, emotionally, and intellectually?

Cassette G10: Backgammon (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £5.95.
Programs – Backgammon. Dice.
Description – A great program, using fast and efficient machine code, with graphics board, rolling dice, and doubling dice. The dice program can be used for any dice game.

Cassette G11: Chess (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Chess, Chess Clock.
Description – Fast, efficient machine code, a graphic display of the board and pieces, plus six levels of ability, combine to make this one of the best chess programs available. The Chess Clock program can be used at any time.

Cassette G12: Fantasy Games (Psion)
Hardware required – ZX81 (or ZX80 with 8K BASIC ROM) + 16K RAM.
Price – £4.75.
Programs – Perilous Swamp. Sorcerer's Island.
Description – Perilous Swamp: rescue a beautiful princess from the evil wizard. Sorcerer's Island: you're marooned. To escape, you'll probably need the help of the Grand Sorcerer.

Cassette G13: Space Raiders and Bomber (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £3.95.
Programs – Space Raiders. Bomber.
Description – Space Raiders is the ZX81 version of the popular pub game. Bomber: destroy a city before you hit a sky-scraper.

Cassette G14: Flight Simulation (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £5.95.
Program – Flight Simulation (plus blank tape on side 2).
Description – Simulates a highly manoeuvrable light aircraft with full controls, instrumentation, a view through the cockpit window, and navigational aids. Happy landings!

Education

Cassette E1: Fun to Learn series – English Literature 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Novelists. Authors.
Description – Who wrote 'Robinson Crusoe'? Which novelist do you associate with Father Brown?

Cassette E2: Fun to Learn series – English Literature 2 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Poets, Playwrights. Modern Authors.
Description – Who wrote 'Song of the Shirt'? Which playwright also played cricket for England?



Cassette E3: Fun to Learn series – Geography 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Towns in England and Wales. Countries and Capitals of Europe.
Description – The computer shows you a map and a list of towns. You locate the towns correctly. Or the computer challenges you to name a pinpointed location.

Cassette E4: Fun to Learn series – History 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Events in British History. British Monarchs.
Description – From 1066 to 1981, find out when important events occurred. Recognise monarchs in an identity parade.

Cassette E5: Fun to Learn series – Mathematics 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Addition/Subtraction. Multiplication/Division.
Description – Questions and answers on basic mathematics at different levels of difficulty.

Cassette E6: Fun to Learn series – Music 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Composers. Musicians.
Description – Which instrument does James Galway play? Who composed 'Peter Grimes'?

Cassette E7: Fun to Learn series – Inventions 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Inventions before 1850. Inventions since 1850.
Description – Who invented television? What was the 'dangerous Lucifer'?

Cassette E8: Fun to Learn series – Spelling 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Series A1-A15. Series B1-B15.
Description – Listen to the word spoken on your tape recorder, then spell it out on your ZX81. 300 words in total suitable for 6-11 year olds.

Business/household

Cassette B1: The Collector's Pack (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £9.95.
Program – Collector's Pack, plus blank tape or side 2 for program/data storage.
Description – This comprehensive program should allow collectors (of stamps, coins etc.) to hold up to 400 records of up to 6 different items on one cassette. Keep your records up to date and sorted into order.

Cassette B2: The Club Record Controller (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £9.95.
Program – Club Record Controller plus blank tape on side 2 for program/data storage.
Description – Enables clubs to hold records of up to 100 members on one cassette. Allows for names, addresses, 'phone numbers plus five lots of additional information – eg type of membership.

Cassette B3: VU-CALC (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £7.95.
Program – VU-CALC.
Description – Turns your ZX81 into an immensely powerful analysis chart. VU-CALC constructs, generates and calculates large tables for applications such as financial analysis, budget sheets, and projections. Complete with full instructions.

Cassette B4: VU-FILE (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £7.95.
Programs – VU-FILE. Examples.
Description – A general-purpose information storage and retrieval program with emphasis on user-friendliness and visual display. Use it to catalogue your collection, maintain records or club memberships, keep track of your accounts, or as a telephone directory.

How to order

Simply use the FREEPOST order form below and either enclose a cheque or give us your credit card number. Credit card holders can order by phone – simply call Camberley (0276) 66104 or 21282 during office hours. Either way, please allow up to 28 days for delivery, and there's a 14-day money-back option, of course.

sinclair ZX81 SOFTWARE

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Stanhope Road, Camberley, Surrey, GU15 3PS.
Tel: Camberley (0276) 66104 & 21282.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR.
Please send me the items I have indicated below.

Qty	Cassette	Code	Item price	Total
	G1: Super Programs 1	30	£4.95	
	G2: Super Programs 2	31	£4.95	
	G3: Super Programs 3	32	£4.95	
	G4: Super Programs 4	33	£4.95	
	G5: Super Programs 5	34	£4.95	
	G6: Super Programs 6	35	£4.95	
	G7: Super Programs 7	36	£4.95	
	G8: Super Programs 8	37	£4.95	
	G9: Biorhythms	38	£6.95	
	G10: Backgammon	39	£5.95	
	G11: Chess	40	£6.95	
	G12: Fantasy Games	41	£4.75	
	G13: Space Raiders & Bomber	42	£3.95	
	G14: Flight Simulation	43	£5.95	
	E1: English Literature 1	44	£6.95	
	E2: English Literature 2	45	£6.95	
	E3: Geography 1	46	£6.95	
	E4: History 1	47	£6.95	
	E5: Mathematics 1	48	£6.95	
	E6: Music 1	49	£6.95	
	E7: Inventions 1	50	£6.95	
	E8: Spelling 1	51	£6.95	
	B1: Collector's Pack	52	£9.95	
	B2: Club Record Controller	53	£9.95	
	B3: VU-CALC	54	£7.95	
	B4: VU-FILE	55	£7.95	
	ZX 16K RAM pack	18	£29.95	
	ZX Printer	27	£59.95	
	Post & packing – *only if ordering hardware*		£2.95	

TOTAL £ ____

I enclose a cheque/postal order to Sinclair Research Ltd for £____

Please charge my *Access/Barclaycard/Trustcard no.
**Please delete as applicable.*

Mr/Mrs/Miss

Address

NSA 21



```
150  DRAW 2 AT X%(I),Y%(I):YY%(I) = Y%(I): POKE PIT,PP%: POKE DUR,20: CALL
     NOISE: IF V%(I) =  - 3 AND Y%(I) < HT% + ( INT (30 *  RND (1))) THEN
     V%(I) = 3
170 I% =  PDL (0)
180  IF I% < 15 THEN I% = 15
190  IF I% > 240 THEN I% = 240
200  DRAW 1 AT I%,K%:II% = I%
220  IF CH%(I) = 0 THEN 270
230  IF Y%(I) <  > 148 THEN 240
235 CH%(I) = 0: XDRAW 2 AT X%(I),YY%(I): POKE PIT,250: POKE DUR,150: CALL
     NOISE:PT% =  - 20:DF% = 1: GOSUB 2000
240  IF Y%(I) <  > 142 THEN 270
245  IF ((I% > X%(I) - 15) AND (I% < X%(I) + 6)) THEN V%(I) =  - 3: POKE P
     IT,120: POKE DUR,100: CALL NOISE:PT% = 10:DF% = 0: GOSUB 2000
270  XDRAW 1 AT II%,K%
275 PP% =  INT ( RND (1) * 2) * 200
280  NEXT
290  GOTO 100
994  REM
995  REM      *******************************
996  REM      INPUT DATA AND MACHINE CODE
997  REM       SUBROUTINE FOR SOUND AND SHAPES
998  REM      *******************************
999  REM
1000 K% = 143:SC% = 0:S% = 5:A% = 5:R% = 0:C1% = 3:C2% = 5
1010  FOR I = 0 TO 8:V%(I) = 3:CH%(I) = 0: NEXT
1020 NOISE = 786:PIT = 789:DUR = 787
1030  FOR I = 768 TO 799: READ J: POKE I,J: NEXT
1035  REM     ====================
1036  REM     DATA FOR SHAPES TABLE
1037  REM     ====================
1040  DATA   2,0,6,0,11,0,45,53,63,39,0
1050  DATA   60,44,44,46,190,60,0
1055  REM
1056  REM  DATA FOR SOUND ROUTINE
1057  REM
1060  DATA    160,255,162,160,202,208,253,173,48,192,136,208,245,96
1065  REM
1066  REM  SET STARTING ADDRESS FOR MACHINE CODE SUBROUTINE
1067  REM
1070  POKE 232,0: POKE 233,3
1080  RETURN
1084  REM
1085  REM  ===============
1086  REM  SET UP BASE LINE
1087  REM  ===============
1088  REM
1090  HGR : HCOLOR= C2%: SCALE= S%: ROT= R%
1100  FOR I = 279 TO 0 STEP  - 1: HPLOT I,150: POKE PIT,I * .5: POKE DUR,1
     0: CALL NOISE: NEXT
1110  FOR I = 0 TO 279
1120  HPLOT I,151
1130  POKE PIT,I * .5: POKE DUR,10: CALL NOISE
1150  NEXT
1160  HCOLOR= C1%: RETURN
1494  REM
1495  REM          **************
1496  REM           TITLE ROUTINE
1497  REM          **************
1498  REM
1500  HOME : VTAB 3: HTAB 10
1501  FOR I = 1 TO 16: PRINT "*";: POKE PIT,100: POKE DUR,100: CALL NOISE:
      NEXT
1502 A$ = "*ALIEN LEMMINGS*": VTAB 4: HTAB 10
1503  FOR I = 1 TO  LEN (A$): PRINT  MID$ (A$,I,1);: POKE PIT, ASC ( MID$
     (A$,I,1)): POKE DUR, ASC ( MID$ (A$,I,1)) / 30: CALL NOISE: NEXT
1504  VTAB 5: HTAB 10
1505  FOR I = 1 TO 16: PRINT "*";: POKE PIT,100: POKE DUR,100: CALL NOISE:
      NEXT
1506  PRINT : PRINT : HTAB 10: PRINT "BY BOB PENROSE - FEB 1982"
1510  VTAB 12: HTAB 1: CALL  - 958: PRINT "LEVEL (1-5) ";
1520  GET Q$: IF Q$ <  CHR$ (49) OR Q$ >  CHR$ (53) THEN  PRINT  CHR$ (7);
```

Illustration: Jon Davis



```
 : GOTO 1520
1530  PRINT Q$;:L% =  VAL (Q$)
1535  GET Q$: IF Q$ =  CHR$ (8) THEN 1510
1537  IF Q$ < >  CHR$ (13) THEN 1535
1540  ON L% GOTO 1550,1560,1570,1580,1590
1543  REM
1544  REM    ************************
1545  REM    SET UP STEP SIZE FOR LOOP
1546  REM    PROBABILITY,HEIGHT AND
1547  REM    HIGH SCORE FOR EACH LEVEL
1548  REM    ************************
1549  REM
1550 ST% = 4:R = .95:HT% = 80:HS% = 500: RETURN
1560 ST% = 4:R = .9:HT% = 100:HS% = 300: RETURN
1570 ST% = 2:R = .95:HT% = 80:HS% = 250: RETURN
1580 ST% = 2:R = .9:HT% = 100:HS% = 200: RETURN
1590 ST% = 1:R = .95:HT% = 80:HS% = 150: RETURN
1594  REM
1595  REM      ******************
1596  REM      SCOREBOARD ROUTINE
1597  REM      ******************
1598  REM
1600  HOME
1610  VTAB 21: HTAB 1: INVERSE : PRINT "LEVEL";: NORMAL : PRINT " ";: INVERSE
 : PRINT "*";: NORMAL : PRINT L%;: INVERSE : PRINT "*"
1620  VTAB 21: HTAB 24: PRINT "***********"
1630  VTAB 22: HTAB 13: PRINT "***";: HTAB 24: PRINT "*SCORE";: HTAB 35: PRINT
"*"
1640  VTAB 23: PRINT "ALIENS LEFT";: HTAB 13: PRINT "*";: NORMAL : PRINT A
%;: INVERSE : PRINT "*";: HTAB 24: PRINT "***********"
1650  VTAB 24: HTAB 13: PRINT "***";: NORMAL
1660  VTAB 22: HTAB 34: PRINT SC%: RETURN
1990  REM
1991  REM    **********************
1992  REM    CHECKS AND PRINTS SCORE
1993  REM    **********************
1994  REM
2000 SC% = SC% + PT%
2010  IF SC% < 0 THEN SC% = 0
2015  VTAB 22: HTAB 31: PRINT "    ": REM  -4 SPACES-
2020  VTAB 22: HTAB (34 - (SC% > 9) - (SC% > 99) - (SC% > 999)): PRINT SC%

2030 A% = A% - DF%: VTAB 23: HTAB 14: PRINT A%
2040  IF A% = 0 THEN  POP : GOTO 2500: REM  -YOU LOSE!-
2050  IF SC% = HS% THEN  POP : GOTO 3000: REM  -YOU WIN!-
2060  RETURN
2490  REM
2491  REM     ************
2492  REM      END OF GAME
2493  REM     ************
2494  REM
2500  TEXT : HOME
2505  VTAB 21: HTAB 1: CALL  - 958
2510  PRINT "YOUR SCORE IS ";SC%;" ON LEVEL ";L%
2520  PRINT : PRINT "PLAY AGAIN (Y/N)? ";
2530  GET Q$: PRINT Q$: IF Q$ = "Y" THEN  RUN
2540  IF Q$ < > "N" THEN  PRINT  CHR$ (7);: GOTO 2530
2550  TEXT : HOME : PRINT "THANKS FOR PLAYING": END
2990  REM
2991  REM      ***************
2992  REM       VICTORY SALUTE
2993  REM      ***************
2994  REM
3000  TEXT : HOME
3010  FOR I = 50 TO 1 STEP  - 1
3020  POKE PIT,5 * I: POKE DUR,5 * I: CALL NOISE
3030  NEXT
3040  VTAB 10: HTAB 10
3045  FLASH : PRINT "========="
3050  HTAB 10: PRINT " YOU WIN "
3055  HTAB 10: PRINT "=========": NORMAL
3060  GOTO 2505
```

PRACTICAL PROGRAMMING

THE IMPORTANCE OF GOOD COMMUNICATION

Communication and interaction between the program and the user is a particularly important subject. In most cases all the user will see is what appears on the screen, and the program will be judged by how helpful the instructions are and how easy they are to follow.

Instructions should always be included in the program, even if you are going to be the only person using it. It is surprisingly easy to forget how to operate a program when you have not seen it for six months. Where the instructions are long and complicated full instructions may have to be provided separately, as text accompanying a listing in a magazine or as a printed sheet or booklet accompanying a program sold on tape. However, even when a complete set of printed instructions is available the program should still include some instructions and helpful prompts.

It is useful to include a HELP function in your programs, and this can be done quite easily if the instructions are contained in a subroutine. For example:

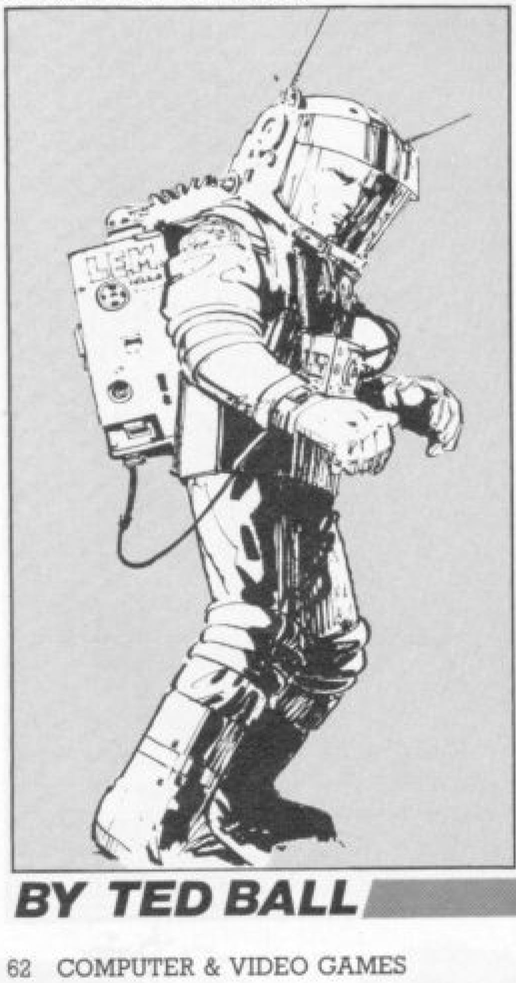


Illustration: Jon Davis

```
1000 CLS
1010 PRINT "THE OBJECT OF
  THE GAME IS . . ."
1020 PRINT . . .
  . . . . . . . . . . . . . . . . . . . . . . . .
1100 PRINT . . .
1110 PRINT "PRESS ANY KEY
  TO CONTINUE"
1120 GET A$
1130 IF A$=" " THEN GOTO 1120
1140 RETURN.
```

The program can begin with the usual:

```
10 PRINT "DO YOU WANT
  INSTRUCTIONS? (Y OR N)"
20 GET A$
30 IF A$="Y" THEN GOTO 60
40 IF A$="N" THEN GOTO 70
50 GOTO 20
60 GOSUB 1000: REM PRINT
  INSTRUCTIONS
70 . . .
```

The HELP function can then be implemented by testing for the user typing "H" or "HELP" whenever an input is being processed. For example:

```
100 GET A$
110 IF A$="H" THEN GOSUB 1000
120 IF A$="L" THEN GOSUB 2000
130 . . .
```

This allows the user to see the instructions again at any time. Of course, you must remember that printing the instructions will destroy the display, and you may have to add extra instructions to restore the display afterwards.

Another point to remember when the instructions are long and need to be printed in two or more blocks is to allow the user to go back and re-read earlier blocks.

If the instructions can be divided into sections each of which applies in only one part of the program it is best to arrange HELP so that it gives only the instructions that refer to the part of the program currently being executed.

The amount of detail you need to give in the instructions depends on how well-known the game is and how complicated the instructions are.

For example, in a chess program you only need give instructions on how to enter moves into the computer and how to use any extra features like recording a game, as anyone wanting to use a chess program will already know how to play the game.

Even in a simple and well-known game you may sometimes want to include full instructions; for example, although you may think that no-one needs to be told how to play Noughts and Crosses it would be advisable to include full details if the program is likely to be used by young children.

With lesser-known games you will need to provide full details of how to play the game, even if the game is described in easily available standard books.

There are many people who will type in a long program if the instructions are complete and the description makes the game look interesting but will not bother if they have to go to the trouble of getting a book before they can play the game.

DESIGNING THE SCREEN LAYOUT

Screen layout is another feature that should be designed carefully to make things easy for the user. Although the type and amount of information you need to display depends on the program there are some general principles that should be kept in mind.

The current state of the game should be displayed prominently and the screen should not be cluttered with subsidiary information that is not of immediate use.

The best format is usually to have the main action in the central part of the screen and put any numerical or textual information at the top or bottom.

With action games of the space invaders or asteroids type the main problem is producing the moving graphics. The only other information needed is the player's current score and the best score to date, and perhaps the number of laser bases or spaceships the player has left.

In this type of game the scores, etc., are not essential to the player but should be displayed so he can see how he is doing. But there are games like Moon Lander where height, speed, etc. are essential.

BY TED BALL

In this case the essential information should be displayed clearly and fairly close together on the screen. The player should not have to keep shifting his attention from one part of the screen to another to find the required information, when he needs to concentrate on what should be done.

ADVENTURE AND INFORMATION . . .

At the other extreme we have the Adventure type game where there is a large amount of textual information and there is not room on the screen for all the current data on the state of the game.

In such cases it is necessary to separate the information into a number of blocks and allow each block to be called up to the screen whenever it is wanted.

Adventure was originally designed for large mainframe computers where the usual input/output device was a hard copy terminal or a VDU that simulated a hard copy terminal.

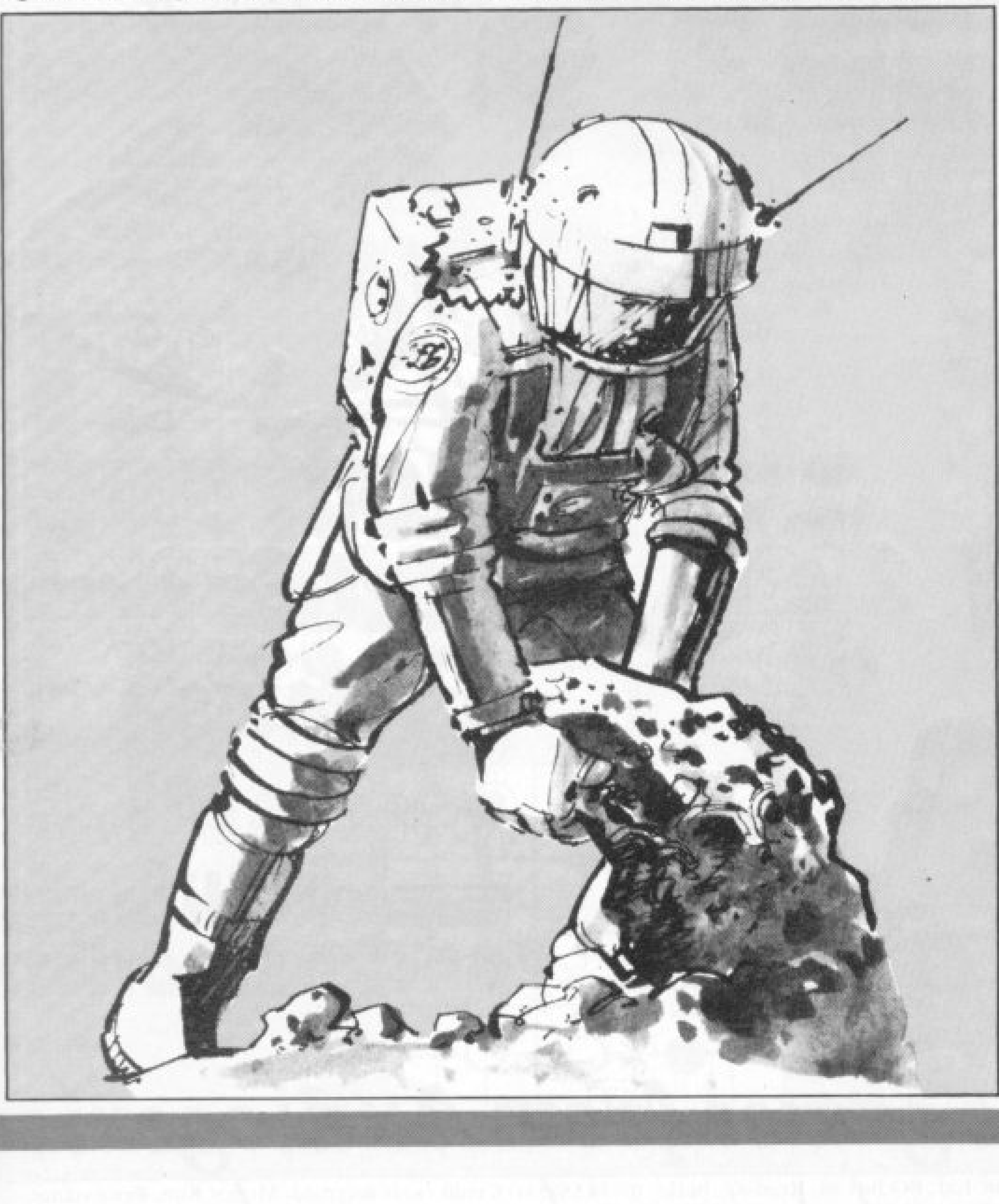
Because of this, the information was displayed as text which scrolled up, and on a VDU the old information was lost whenever new information was printed.

The earliest Adventure games on home microcomputers followed this practice, but with a memory-mapped screen it is possible to do better.

The information provided in an Adventure program generally falls into one of two types: permanent or semi-permanent information like the description of current surroundings or the inventory of the player's equipment, and transitory information like the result of performing an action.

The more recent Adventure-type games designed specifically for microcomputers take advantage of the memory-mapped screen by dividing the display into two sections for the two types of information.

This makes it possible to leave, for example, the inventory on the screen while the player is typing in a number of commands trying to get something to happen.



DEALING WITH STRATEGY GAMES

In strategy games the amount of information you need to display can vary, according to the game, from a simple graphical picture of the current position and a note of whose turn it is, up to complex graphics, several different scores, and a record of all the moves to date.

The main point to watch with this kind of game is that the screen does not get filled with irrelevant or out of date information, and also that the player can easily see the latest move and the effect it has on the state of the game.

In most cases you only need to provide simple messages, "MY TURN", "YOUR TURN", "I WIN", etc, but it is often useful to provide a little more. For example, in Noughts and Crosses it is more helpful if the prompt says something like "YOUR TURN: PLEASE TYPE IN ROW NUMBER, COLUMN NUMBER".

You should also try to make the program's responses as fast as possible, as people will soon get bored if they regularly have to wait while the program is working out its move.

If an occasional slow response is unavoidable it is best to indicate this to the player with a message, like "I'M THINKING. PLEASE WAIT A MOMENT". This will also tell the player that the machine is still working, and he will not get worried about the computer having crashed when nothing happens for a few seconds or tens of seconds.

The best way to improve the appearance and usability of your programs is to look at them, and at other people's programs, critically, and note the good and bad features.

If you think about what you like and dislike in the programs you use you will be better prepared to include the former and exclude the latter next time you program.



5 More great VIC Cartridge games from Audiogenic

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GO

Having shown an approach to programming the rules of Go in previous articles, this one is devoted to those impatient souls who ask "Yes, BUT how do you get it to play?" Getting a computer to play Go well is a very ambitious project. We shall limit ourselves in this article to the simplest possible solution to getting a program to play at all!

The problem is best attacked by examining the result that each player must achieve. Figure 1 shows the end of a game — a rather artificial game for the sake of clarity. The stones marked ▽ show the territorial boundaries. The players score one point for each vacant intersection in their territory. If they could have avoided it — it's easy with hindsight! — they wouldn't have played the unmarked stones at all, because each reduces their potential score by a point.

The game is clearly over because not only can neither player benefit by playing in their own areas but playing inside their opponent's areas which are so well established would be suicidal.

Now take a couple of moves back — see figure 2. The only sensible moves possible are at the intersections indicated by a cross. Why? Because these places define the boundary between opposing armies. Or more concretely — each is next to both a white and a black stone. In this context, "next" means any of upto eight intersections — less at the edge of the board — surrounding the intersection in question.

Figure 3 shows the same game earlier on. The intersections next to both black and white stones are marked with a cross. These provide a subset of the moves either player might make. The other moves depend on a perception of where the territories will form. Easy for a human! Very difficult for a computer program! So let us restrict our computer to playing on those clearly detectable boundary intersections.

Progress indeed! But what happens at the beginning of the game. Unfortunately on an empty board there are no intersections next to both black and white stones — nor will there be for several moves to come!

One way to overcome this hurdle is to select a set of default points so that if the program cannot find a boundary intersection it can use a default point instead.

Figure 4 shows a good pattern for a 9x9 board. There are enough default points so that detectable boundaries are certain to occur, and incidentally, these are good strategic points to play on anyhow.

However, it is important to delete a default point once a stone is played next to it. As the game gets underway, the territorial boundaires must become paramount.

One problem remains. Which of the several options at each move should the program choose? The simplest answer is that it does not matter — any solution will do. For instance, if the Basic you use can generate random numbers, why not use this facility to pick one of the options in an unpredictable fashion?

The standard of play of the program leaves a lot to be desired but:

- It can form territories
- It will not invade opponent's areas when it is silly to do so
- Less obviously, it does capture opponent stones that do not manage to surround territory
- And it knows when to stop!

The next article will examine some of the ways of improving this very basic but effective method of computer play.

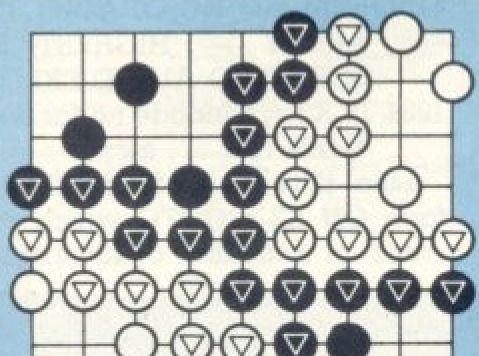


Fig 1.

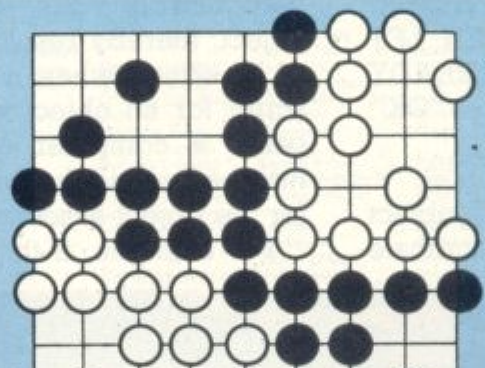


Fig 2.

Fig 3.

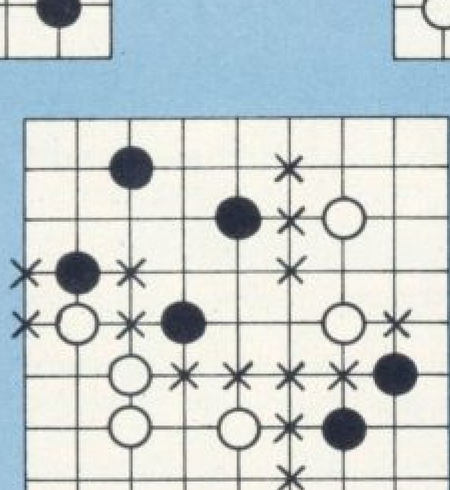
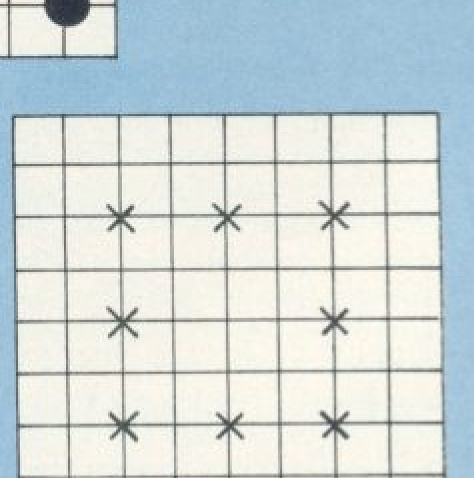


Fig 4.



Adventure

WATER, WATER, EVERYWHERE!

Filling a bucket with water sounds a simple act but can lead to nasty complications in an Adventure program.

Water is a substance that can make programming a real headache, since it doesn't obey the simple rules that most objects follow. To take any you must be carrying a suitable container.

The second complication is that having filled your container, there is still nearly as much water left as before! How can we cope with that?

If water is treated as an object in the object array, then when taken it will disappear from its original location. So a way round this is to use a flag, and to include the presence of water in the location description.

Let's refresh our memories about our existing TAKE routine:

```
1100 IF P(K2) ◇ LN THEN 3010
     ELSE LET P(K2)=50: LET IN =
     IN+1
```

We can interrupt this line by inserting:

```
1100 IF R3$ = "WATER" THEN
     1234 ELSE IF P(K2) ..... etc.
1234 IF LN ◇ 14 THEN LET Q1$ =
     "I DON'T SEE ANY HERE"
     ELSE IF P(12) ◇ 50 THEN LET
     Q1$ = "NO CONTAINER"
     ELSE IF C(12)=3 THEN LET
     Q1$ = "BUCKET'S ALREADY
     FULL" ELSE LET Q1$ = "OK":
     LET C(12) = 3
1235 GOTO 100
```

In the above the bucket is object no. 12 and its flag C(12) will indicate whether it is full or empty — 3 if full, else 2. 50, you may remember, is the notional location number we assigned to any object in the player's inventory.



Water, of course, will have to be a recognisable noun rather than an object, thereby resulting in a value of K2 which when used as a subscript for an object variable could cause a computer error, since it may be beyond the dimension limits for the object-associated arrays.

For example, if there are 20 objects and 30 nouns in the game, the noun WATER may return a value of 25 for K2. Thus the original line 1100 will bomb, as will our modified version, if another noun is TAKEN.

The solution is to first scan the object array for a recognisable object. If not found, scan the noun string. If a valid noun is found, add to its found position in the string the highest dimension of the object array.

The noun string is now effectively an extension of the object array, the resulting value of K2 being unique for object or noun.

We can now once again modify line 1100:

```
1100 IF K2 > n THEN 1234 ELSE IF
     P(K2) ...
1101 REM n = NO OF OBJECTS IN
     ARRAY — HIGHEST SUB-
     SCRIPT TO AVOID ERROR.
1234 IF K2 = (decode no for water)
     THEN LET ... etc.
```

Line 1234 could have taken the form ON K2-n GOTO which could cater for a number of situations.

For Western fans there's real atmosphere in Ghost Town, another Scott Adams game. This is pure Adventure with excitement and mystery at every turn.

Walking up the deserted street you will really feel as if you are there, and quite chilling that feeling is when you discover you are the only person there. Who then, is ringing that bell?

Try buying a lunchtime drink in the saloon and you'll be out of luck, but what gives after nightfall?

There are many different problems to solve. How do you break IN to a jail? How do you ride a horse? Can you find one? Scott's punctuation doesn't make it easy! How do you blow up a safe? Why does your Stetson feel so uncomfortable? And where oh where are those last two treasures hidden?

All these, and answers to many other spine chilling mysteries will gradually be revealed as you play Ghost Town — one of my personal favourites among Adventures!

Ghost Town runs on Atari, Apple, Sorceror, TRS-80 and Video Genie machines.

TIME SEARCH FOR ANOTHER DOCTOR WHO

I have been venturing into the past and future in The Time Machine, the latest in the Mysterious Adventures series from Molimerx, the Bexhill based TRS-80 software specialists.

The plot is quite original. You, the player, are a journalist seeking to interview Doctor Potter, the inventor of a Time Machine.

Sounds fairly straightforward, but unfortunately Doctor Potter has mysteriously disappeared. Another snag is that the Time Machine has developed a fault, and is rather unreliable.

You have to mend the machine and then find Doctor Potter. In your quest you will visit many strange places, as diverse as Troy, a black monolith, and the ghost galleon Marie Celeste.

Time Machine is presented with a split screen, with location details at the top and conversation scrolling beneath this. Lower case will be displayed if your machine has this feature. The enjoyment of the game is considerably enhanced by the use of a couple of quite clever visual effects, which I will leave you to discover.

I sat down with my family, and we just managed to complete the game in one long evening sitting — but there were five of us and we are all hardened Adventurers! So this would possibly make an ideal first for someone not wanting to solve the seemingly impossible.

Time Machine runs on a 16K TRS-80 Model I and III, and Video Genie. Molimerx have announced that the series is now to be published in the United States. Good luck to them and to author Brian Howarth!

BY KEITH CAMPBELL

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(CVG 0982)—Computer & Video Games—Sept. 1982.

GAMES SAY

Life and games are governed by strategies and tactics. That's what makes game playing interesting. ARNOLD ARNOLD, in the last of his articles on the deeper meanings behind the games people play, deals with the general solution of the chess problem — with Noughts and Crosses thrown in for good measure.

A recent article in this magazine suggested that it is impossible to look at every variation for the game of Chess or even for the game of Noughts and Crosses.

But all variations for Noughts and Crosses can now be calculated precisely on a computer, but you would have to play for 28,519 years — day and night — at three minutes per game to play out all of them.

The game of Noughts and Crosses offers five thousand million variations.

Chess involves a far larger sum that is also calculable now. You'd run out of time and paper in the universe if you were to try to play all of them. The principles for both games are the same, despite the different conditions of play.

Games of pure strategy are those where all the facts are fully visible to the players throughout. No secret or randomised factors are every involved, except the intentions of the players — or so it was believed until now.

As stated earlier, the sum of possible intentions is now a calculable entity. Chess is enormously complex and Noughts and Crosses very simple, but the principles are the same although the details differ. Let us see what all of this means in so far as one of the simpler games is concerned. The same meanings will be found to hold true for more complex games.

The only error free and therefore perfect game between equals always ends in a draw. An early draw is a game in which both players can foresee what is conventionally called a stalemate. But a stalemate is merely a misunderstood draw played to the last or last-but-one turn.

That's true for both Noughts and Crosses and chess, although champions are usually reluctant to admit it. Either game is won only by default — i.e. by trading on or inducing mistakes in the other player.

That means employing tactical feints — dirty tricks — waiting for the other to do something stupid and careless, or by inducing such errors by means of perpetual psychological warfare. Bobby Fischer was an expert at such ploys.

In chess, Noughts and Crosses or Go, most players believe that they have an advantage if they have the first move (i.e. white in chess). The fallacy of that belief is best illustrated by what occurs in Noughts and Crosses.

The sum of all choices for both players = 45. The first moving player enjoys 25 of these (9+7+5+3+1) and the second only 20. The first moving player therefore has a severe numerical disadvantage in winning terms. He can make five more mistakes than the second moving player. But both have an equal opportunity to foresee or achieve an error free result — a draw — if both play flawlessly.

This can be tested quite simply. Try for the earliest victory. The first moving player has an advantage there. He has the earliest opportunity to trade on his partner/opponent's mistake, but only if the second moving player is immature, inexperienced, inattentive, stupid, drugged, drunk or insane.

But what has the winner won? He has won by default. Later on in the game, and if he blunders, the first moving player can lose just as easily.

So the whole thing is largely a matter of attention, attitude or doing things by the numbers, or lack of any of these. Of the five thousand million possibilities for Noughts and Crosses, only six need to be considered seriously.

These are: the non-game; the win: lose game; the early draw; the stalemate; the interrupted game; or the game played in violation of the rules.

No other outcomes are possible and all are caused by strategies and tactics or randomness, no matter which games you play or by which rules. The draw is the only balanced outcome, based on an absence of any error.

Any seeming deviation from these principles can only be due to artificially created scoring imbalances or by looking only at 2 × 2 games.

The only conclusions are that people win in the conventional sense because they have the wrong values, consider too much or too little data, don't understand what they are doing or fail to pay attention.

Others lose because they don't understand, don't pay attention, or allow themselves to be distracted and victimised.

The only equal players are those who achieve a draw and who understand what that means. In the highest sense the draw means perfection, perfect co-operation between equals, balance, peace and harmony.

What should interest game aficionados is that it is far more difficult to achieve a conscious draw than a victory. Try playing Noughts and Crosses on a 9 × 9 diagram with a winning requirement of 5-in-a-row.

Try for the earliest draw systematically, symmetrically and then assymetrically and you'll really have a challenge on your hands, whether you play with a computer or with a human being.

These obvious principles should have been understood long ago. But they were only understood in the orient. Most chess championships end up with a long series of draws and stalemates until the required number of games are won — by default.

The best games these champions play are said not to count. Prize money is only awarded to the "winner." Playing to win solely for the sake of money corrupts.

It fools all those who don't understand or don't want to understand. The first can be excused because they have been victimised by wrong beliefs of long standing.

They have been conditioned to believe all the wrong things. The latter are simply unprincipled opportunists, people who want to win at any cost.

This should not discourage people who play games for fun or to discover the meanings of games. Achieving a draw with an equally matched game partner is a considerable achievement.

Games are amusing, fascinating and important, especially now that we have the capacity to model games with precision on any computer or calculator. We can therefore discover the cause and consequences of every move AND of every player's intentions.

We can be sure of who plays for the sake of trying to achieve perfection, cooperation and peace and who merely wants to victimise us.

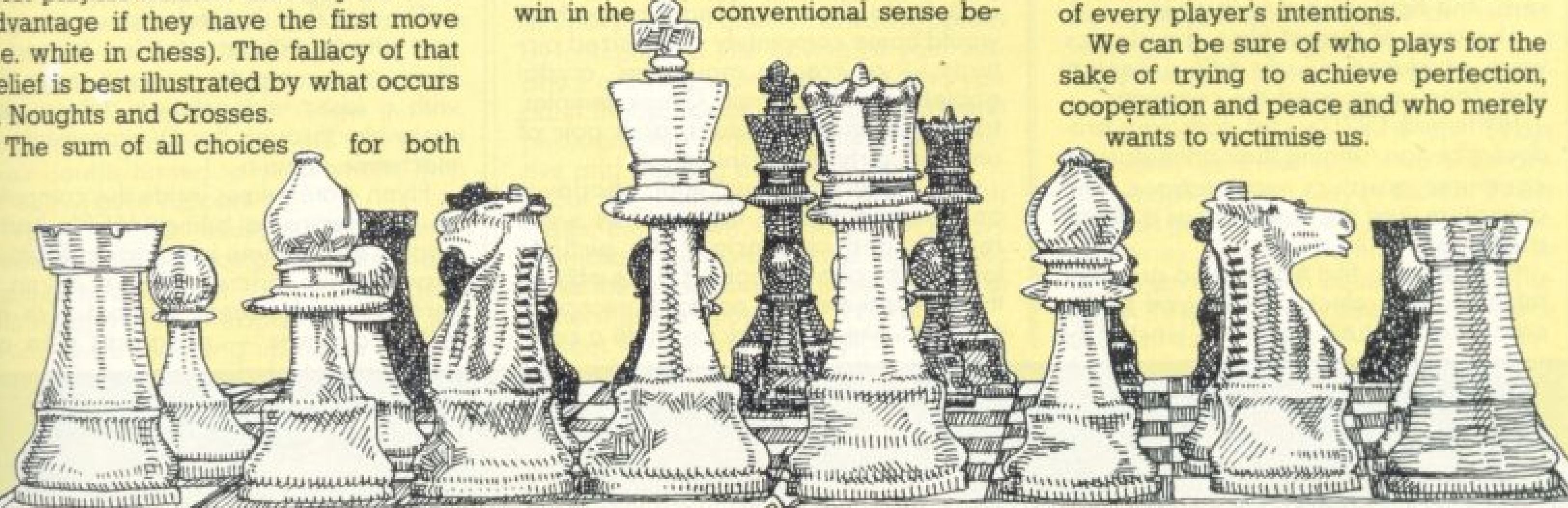
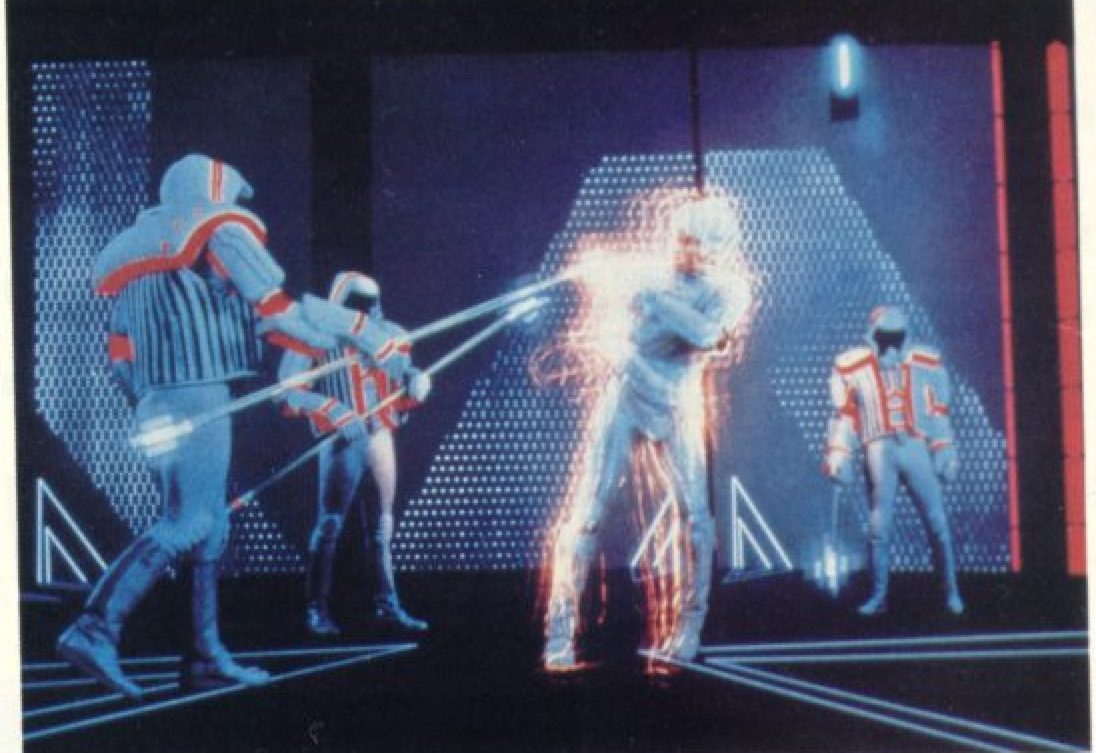


Illustration: Dave McTaggart

THE MAKING OF

TRON

BY FRED D'IGNAZIO



One day, just a few months ago, two men were squeezed inside a cramped trailer on a Walt Disney studio backlot in Burbank, California. They were peering intently at a computer picture screen.

At first the screen was blank. Then glowing, darting images appeared: Giant, horseshoe-shaped flying battleships. Telephone receivers that raced across a fishnet of pure light. Squat, sleek tanks that fired deadly energy bolts.

The inside of the trailer echoed and rocked with the men's impromptu applause, laughter, and sudden arguments. Then silence.

One man scribbled notes on a sheet of paper. The other pushed buttons on a keyboard below the screen. The tanks moved forward, then backward, then forward, all in slow motion. The battleships — alias *Recognizers* — rotated and approached until they loomed on the screen.

The telephones — alias *light cycles* — froze in place on the infinite grid, then inched forward and collided in a burst of blinding light.

What were the men doing? It appeared as if they were playing a sophisticated video game. But they were not playing a game. They were making a movie.

The two men were Jerry Rees and Bill Kroyer, two Disney animators with impressive credits. Both had worked on a number of animated films for Disney and other producers. Rees recently worked on **Pete's Dragon**. Kroyer helped to animate **The Fox and the Hound**.

Now the two were working on **Tron**, the story of a renegade video game designer's heroic battles in a microscopic fantasy world inside a computer.

In the olden days at Disney — the 1930s through the 1950s — animation was tedious and time-consuming. Dozens of animators laboured painting endless sheets of clear plastic *cells* which were later strung together into a feature-length animated film. It became so expensive, in terms of animators' salaries, that high-quality animated films became rare. The field ceased to evolve.

The state-of-the-art films, the classics, were produced nearly half a century ago. Then up popped the computer.

In the mid-1970's, cost-conscious producers began training their animators on computer graphics workstations. The animators used the computer as a *digital paintbrush*.

They drew a film frame on a graphics tablet with an electric pen wired to the computer. Their picture instantly appeared on the computer's TV screen. At the bottom of the screen stretched an electronic palette — a row of twenty or thirty blocks, each a different colour.

To colour his picture, the animator had only to touch the palette with his pen, then lightly tap the screen. In a few seconds, an artist could colour an entire scene.

Animators let the computer do their colouring. They also let it do entire frames. These frames, known as *in-betweeners*, were mid-points in an action scene. For example, if the hero leaped onto his horse, the animator only needed to draw the beginning and ending film frame. The computer could interpolate all the frames in between and draw them itself.

The animators' early programs were known as *paint* programs. The artists still drew most of the film frames, but the computer helped them work faster.

Then computer scientists discovered a way for the computer to *grow* scenes on its own, completely from scratch. A scientist with no artistic ability could feed the computer a mixture of numbers and complex mathematical formulas, and out would come completely synthesized pictures — of craggy mountains, crystal goblets, bowls of fruit, Greek temples, trees, the rings of Saturn, or a pair of unlaced, dirty tennis shoes.

The texture, colour, light, shadows, and perspective in the pictures were realistic and convincing. The pictures looked like photographs. Yet the objects they represented did not exist, except as minute pulses of electricity inside a computer.

In 1977, Steven Lisberger, a talented young director, called on the executives at Walt Disney Productions at their headquarters on Dopey Drive, in Burbank, California. Lisberger had a fabulous movie to propose, and he wanted Disney to produce it.

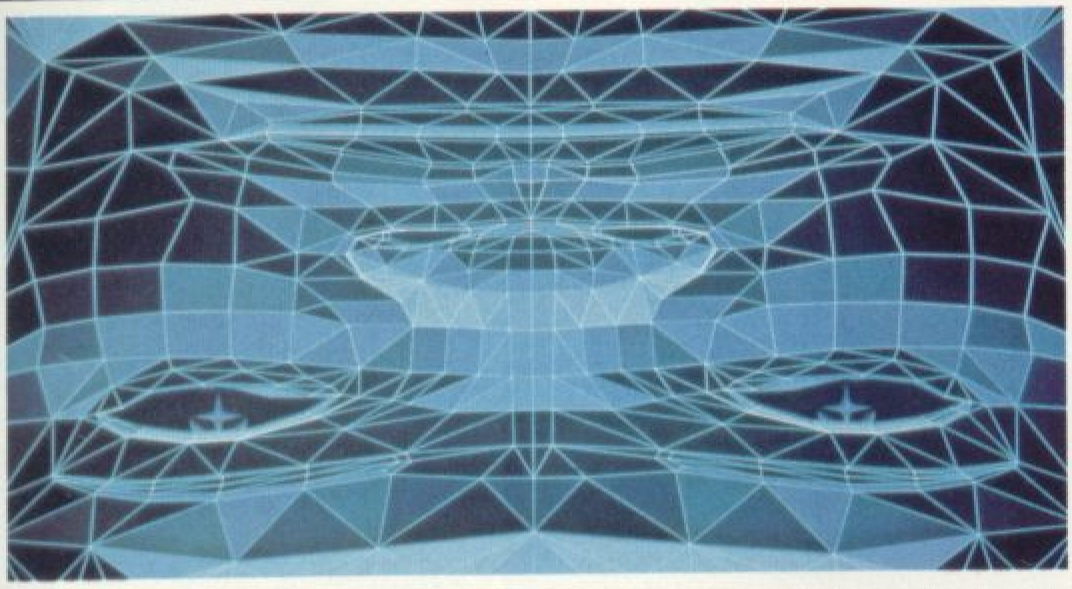
Like fellow director, Steven Spielberg, Lisberger had grown up on magical Disney films like **Snow White**, **Pinocchio**, and **Fantasia**. Now he wanted to bring a little of that magic back to Disney studios where it hadn't been seen for almost fifteen years.

Lisberger had dreamt up a story about Kevin Flynn, a maverick hero who sets out to conquer evil in this world and in a surreal world in the bowels of a supercomputer.

Lisberger's script began with Flynn trying to crack into his old company's computer to locate evidence that his arch-enemy, Dillinger, had swindled him out of several video games he had invented. Bu the computer is controlled by MPC, an ultra-intelligent "Master Control Program".

The MCP is hateful, power-hungry, and utterly without scruples. It catches Flynn at a computer console, zaps him with a laser teleportation device, and sucks him through the TV screen into its electronic domain.

Flynn materializes inside the computer as an electronic being. MCP's brutal guards shove Flynn into a jail cell. Like a gladiator in ancient Rome, Flynn is forced into frequent combat with his fellow captives — programs who re-





sisted MCP and remain loyal to their mythical human *users*.

At the last moment, Flynn discovers an ally: the valiant program, Tron, champion of the human users. Flynn, Tron, and another program, Ram, battle the MCP's warriors on light cycles.

The cycles flash across the game grid leaving multi-coloured energy "walls" in their wake. The walls accumulate forming a maze that the cycles must manoeuvre through and around. The cycles travel at blinding speeds. If a cycle strikes a wall, it explodes and it's rider dies.

Lisberger told Disney executives the story of Flynn and Tron's adventures in the bizarre world ruled by MCP. He described Flynn and Tron's battle to overthrow the MCP, and Flynn's frantic attempt to escape from the computer.

To the conservative executives, Lisberger's film sounded exciting but risky. They were sceptical. They became even more sceptical when Lisberger proposed that the film be completely animated — by computer.

Lisberger's idea was ingenious: He wanted to use computers to create the world inside of the computer.

Lisberger persuaded the executives to let him do a movie pilot. A few months later, the executives saw the pilot, and their doubts turned to amazement, then to enthusiastic support.

When the film finally went into production in 1980, computers and video games had caught up to Lisberger's amazing vision. People all over the world were snapping up home computers and popping billions of coins into computer arcade games.

Also, by 1980, Lisberger had decided not to rely completely on computer animation. He realised that live actors could bring a lot of energy and excitement to the film. He decided that the best combination was a mixture of live action, special effects and animation.

The animation would be done partly by computer and partly by Disney animators. But all of the parts — live action, special effects and animation — had to be blended together into a single film.

The live action in the film was shot in just a few months. The post-production special effects took two years. Of the film's total cost of over $22 million, approximately $6 million went into live-action enhancement. Another $5 million went into computer-generated imagery.

Lisberger wanted the final film to look unique, like something no one had ever seen before. Yet he wanted it to be convincing, believable and real. Live action had to flow invisibly into computer animation. Computer animation had to flow into special effects.

Human animators painted scenes and backdrops that looked as if they were generated by a computer. Film-making computers created characters and effects that looked as if they were painted by humans. Scenes with live actors on barren sound stages were touched up by animators and reflilmed with crimson and blue "backlights" glowing brightly through the actor's costumes, the props and the surrounding geometric landscape.

The result is that the live actors seem to be moving through a computer world created totally by a computer. In fact, out of a total of almost one hundred minutes of film, only 15 minutes are computer generated.

According to Richard Taylor, director of **Tron** special effects: "Creating scenes by computer is like having at your disposal a flawless airbrush artist who can paint thousands of paintings a day with photographic realism, getting perspective and shading absolutely perfect."

But the computer can't work all this magic on it's own. It needs help. Disney animators Bill Kroyer and Jerry Rees gave the computer the cues it needed to generage the images for **Tron**.

Rees and Kroyer's trailer in Burbank was connected, over the telephone to a high-speed mainframe computer located on the other side of the country, in Elmsford, New York. The computer was run by a team of animators and engineers of the MAGI company, one of four computer-graphics companies that worked on **Tron**.

Back in Burbank, Rees and Kroyer fed the computer with a steady diet of storyboards and scene blueprints. They described every aspect of every frame they wanted the computer to produce.

Rees and Kroyer drew upon all their animation experience at Disney to produce the specifications. Computer operators at MAGI then loaded these specifications into the computer as cold, hard numbers.

The computer ran MAGI's "Synthavision" programs to convert the numbers into speeding light cycles, sinister Recognisers, canyons, bridges and tanks. It created the images out of stacks of 3-D building blocks. The building blocks, known as geometric *primitives* included spheres, cones, cubes and ellipsoids. The primitives were added together, subtracted from each other, shrunk, expanded or distorted to make complex looking objects.

The objects were set into motion and transmitted, via the phone line, back to Rees and Kroyer's trailer in California. The animators watched the scenes in miniature on their computer TV screen.

Elsewhere, other computers were busy cranking out other scenes in the film. At Information International, in Culver City, California, a computer was transforming billions of numbers into the jeweled polygons used to build the beautiful *solar sailer* that carries Tron and Flynn to the MCP's headquarters.

Computers at Robert Abel and Associates in Los Angeles were working on the **Tron** titles and Flynn's thrilling journey from the real world into the circuit world inside the computer.

At Digital Effects in New York City, engineers programmed their computer to create one of **Tron's** most memorable characters, a computer *bit*.

The bit could metamorphose it's shape. Sometimes it was a hovering, spiked sphere, other times a floating octahedron. It acted briefly as Flynn's sidekick but could only supply two answers: yes or no.

In the U.S. the film was first released on July 9. Critics of the movie surfaced immediately, decrying it's shallow, comicbook characters, it's weak plot and it's overuse of special effects. According to one reviewer: "Walt Disney never forgot the importance of plot and of making the audience care about the characters. Lisberger has a great deal of talent, but **Tron** would have profited from remembering such basics."

The critic's observation is apt. **Tron** frequently gets lost in its own wizardry.

Perhaps the best way to look at **Tron** is as the grandaddy of a new generation of movies. **Tron** is the first, bold step to a new era in which computers and humans together produce films more magical than anything we've ever seen.


© RICH SHENFIELD 82

Kit Korner

CHIPS WITH EVERYTHING

As an introduction to the exciting field of specialised kit building I am looking at the use of the many peripheral chips available for each of the most popular microprocessors. In later articles, I will be looking at quite a few add-ons which you can easily make up yourself with the minimum of effort. Most of the kits will be usable with any of the systems with little or no modifications.

I have been looking at two particular chips which would suit a number of systems. These are the 6828/8507, a Priority Interrupt Controller, and the 6840, a Programmable Timer Controller. These two chips have been designed for use with the 6800 system but are also equally at home with the 6500 system. It is, of course, possible to adapt the control signals from other systems to comply with those required for these chips.

My purpose for using the 6840 was to time the switching the drive signals to a stepping motor to drive a robot mouse. The robot is required to go around corners and by writing different subroutines into the timer the mouse will perform the turns. I have yet to see whether this is a satisfactory method, but even if it is not I will certainly be able to use it in another project.

The 6840 is part of the memory map in the system and is directly addressable via the bus. The information is placed in the internal registers. There are three 16-bit counters, which decrement, and a set of control lines for each of the counters.

Continuous square waves are possible by using two of the counters. The square waves may be of variable mark/space ratio, but only of one polarity as the chip, unlike some other peripherals, is powered by a single five-volt rail.

This is a useful chip, the 6840, and can be very helpful when the clock of the microprocessor is not of the right frequency or phase. It is very useful when the system is tied up doing other routines and a timing loop of variable frequency is required, which may be difficult to generate by the microprocessor.

The 6828/8507 chip, on the other hand is suitable for the inputs to a system, whereas the 6840 is designed for control applications. One use that comes to mind at this moment is associated with game playing.

Consider a game with two players. One player succeeds in knocking out the opponent's gun. This would normally mean an end to the game. In more realistic battle the enemy would usually have more than one piece of armament.

Would it not be better if the game could continue with the player using a less powerful gun? With the controller chip the actions of one of the players may be slowed or impeded by the routines stored at various locations accessible by the different interrupts whose locations are stored in its registers.

The priorities assigned by this chip are, like the timer, changeable directly by the microprocessor so that the program may vary without the players suspecting it. This can add another dimension to games which may not be all that exciting in the first place, especially when there is a possibility of more than two players taking part.

The priority chip can, of course, be used for more serious applications which I will outline in the coming months. Also I will be showing you some of the routines which are commonly applied to them. There are of course many more chips which have uses for the hobbyists.

It is well worth looking out for generally available chips and also the dedicated ones which are designed for a specific purpose. These can often be adapted for strange and extraordinary uses.

I will also be looking at some of the methods of constructions I used in the first few editions so that those who missed them then will not be at a disadvantage when it comes to kit building. I look forward to some of your enquiries on how to tackle problems which have arisen in trying to create new add-ons and other hardware extras.

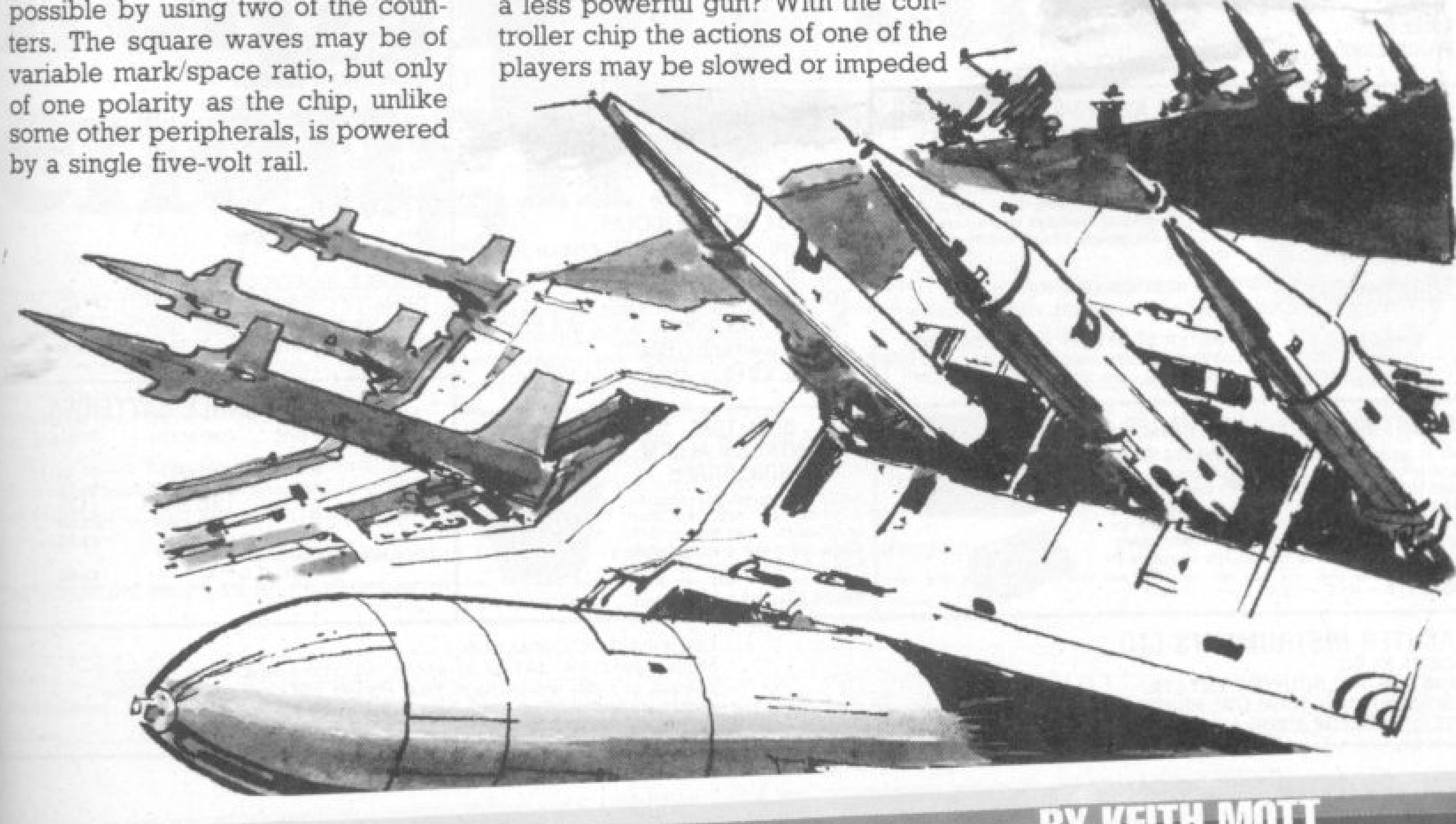


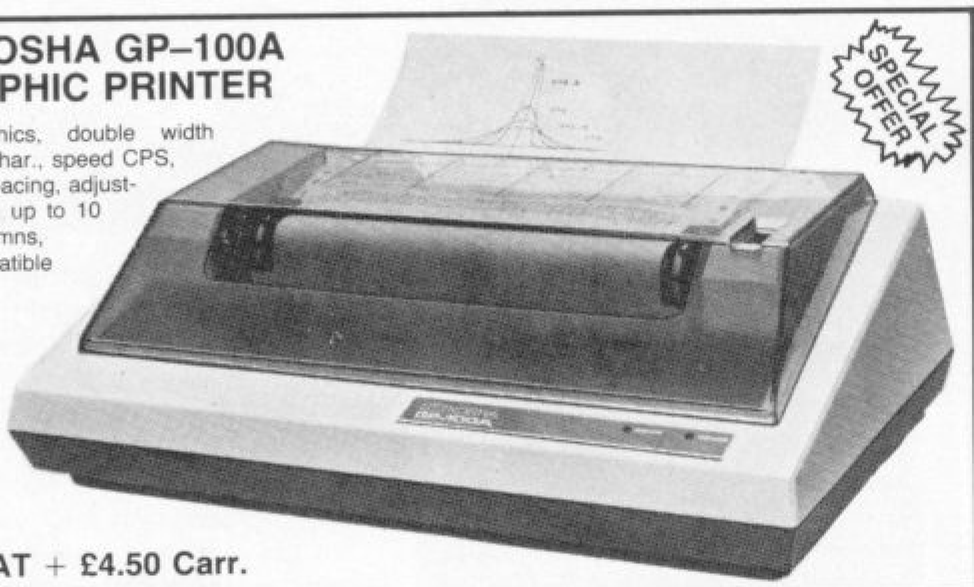
Illustration: Jon Davis

BY KEITH MOTT

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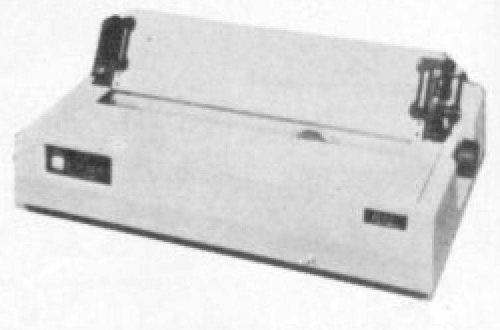
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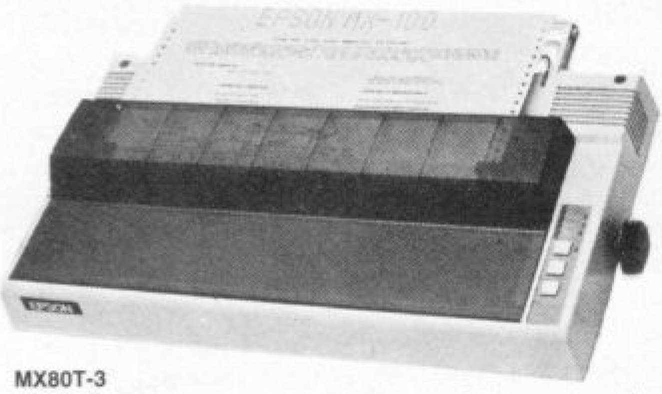
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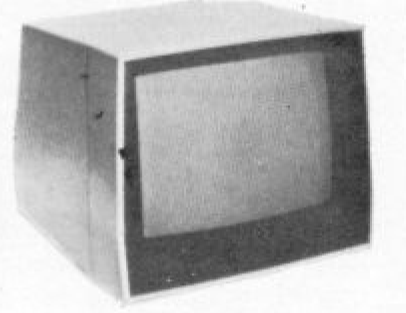
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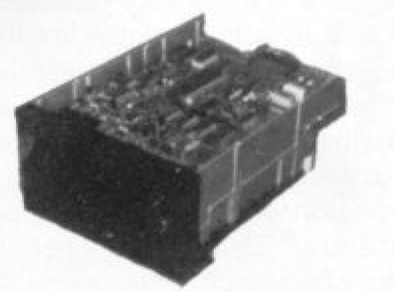
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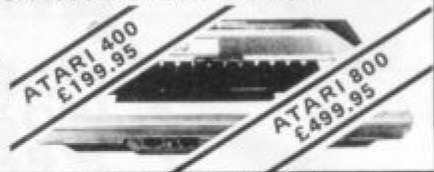
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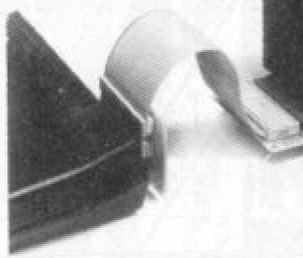
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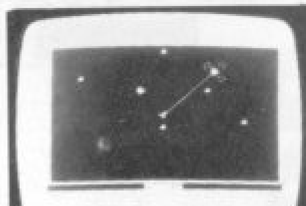
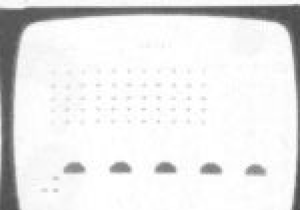
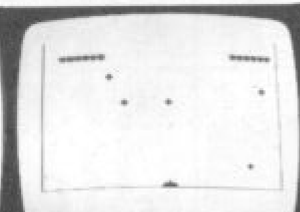
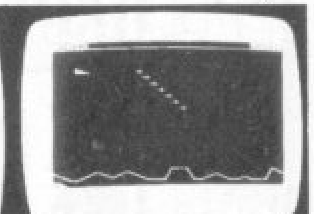
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CENTIPEDE TIPS

Shoot them right between the feelers, may sound an insensitive command but it makes sense against the insect hordes of Centipede.

This fast moving game is a difficult one to give tips on. It seems best suited to the player with a quick trigger finger, fast reactions and co-ordination.

But there are a few shortcuts to the higher scores. The first is to make sure you hit Centipede heads. As the creature bounces its way down the screen, turning every time it hits a mushroom, a hit on the head segment scores 10 times more than the body segments. And as a new head grows each time you hit the old one, you will never run out of them until the creature is destroyed.

The leaping spider is another way to a high score. The bonus for shooting this creature, depends on when it is hit.

The spider is a real threat in the game as it bounds in at an angle making it difficult to hit. That first bound needs quick reactions to survive if you are in the anachid's path. Beginners should not stray too close to the edge of the screen.



The multitude of creatures in Centipede are not always known by their right names. 'Pede is a common abbreviation and the spider is also easily recognised.

But the scorpion has been referred to as an "Angel" and the poor flea has become known as "the Flying Pig".

Tidying up the mushrooms between Centipedes is called: "Doing a bit of gardening" or alternatively "Terrorising the toadstools".

The end of a life bonus system, notches up points for every Centipede segment which you successfully turned into a mushroom — by shooting it.

The bonuses do not accrue if you destroy the mushroom before it has been scored. This is a good case for not engaging in wilful mushroom destruction.

Just shoot out those which are preventing your blaster from moving and, for advanced players, spot the occasions when you can organise a mushroom corridor which will make for easy centipede pickings.

Each time a 'pede hits a mushroom it goes down the screen one level and changes direction. Caught in a corridor of mushrooms the 'pede's head is easily hit.

A scorpion moving across the playfield poisons mushrooms and a 'pede later hitting one of these plummets to the bottom of the screen. Try and hit the scorpion early and limit his poisoning by shooting these mushrooms.

The only way to halt a plummetting 'pede is a direct hit on his head, so stand by underneath and ready for that poisonous touch.

When a non-poisoned segment reaches the bottom other segments come out from the sides to join it. Use your tracker ball to dodge under and shoot them. The continuous fire button gives a new shot each time the previous one makes contact. So a good tactic is to use a low mushroom as an aiming shot and then try to hit the segment as it turns against the mushroom.

GAME, SET AND MATCH

WORLD TENNIS

Wimbledon without tantrums is on offer to all true grass court fans in the new game World Tennis.

The screen is placed in a "Royal Box" type position looking down on the court from above and behind the player you're backing to take the title.

At the other end of the court is the computer-controlled player.

When the ball comes bouncing over the net, you manoeuvre your champion into position and hit the button to bash the ball back, aiming for a good angle which will set the computer controlled player some problems.

If you manage to beat him with a flashing pass or well-disguised drop volley then you'll score the points. If not, then expect the ball to come back across to you again.

The court is laid out in a 3D perspective and a set of four dropped points by you, constitutes a game to the computer.

The server changes and the game continues until the computer player again manages to get the four points necessary to take a game from you. When you have lost two games, you are thrown out of the tournament.

World Tennis is a simple game with obvious rules and no difficult controls to get to grips with.

As the game progresses, the computer player gradually finds better form and can soon become a real handful... but at least he doesn't shout at the umpires.



Illustration: Terry Rogers

MEET THE RECORD BREAKERS

More high scores flooded in from you arcade kings during the last month.

A lot of people wrote in about Battle Zone, detailing scores which put them well above our previous second place tanker. But Matthew Parnum with over five million stills holds off all-comers at the top spot.

Greg Parsons wrote to point out that many Battle Zone machines will occasionally offer a saucer and missile at the first push of the start button and then comes up with a score well into the millions. So watch out for this bug—sounds like a Screaming Foul-up special.

New high scores have come in for Pacman and Gorf, with 12 people writing in to better John Lee's previous record, but not by much,

Two new games we have included are: Tempest and Dig-Dug. But still no word on Qix or Galaga.

TEMPEST
414,716
Richard Holt
SCRAMBLE
867,320
Paul John
GORF
282,860
J Cameron
PHOENIX
359,000
Daniel Oldham
PACMAN
738,980
A. Wilson
FROGGER
87,050
Danny Blackmoor
MISSILE COMMAND
12,000,000
Simon Lord
DONKEY KONG
369,000
Paul Dack
DIG-DUG
591,430
Stephen Broadbent
BATTLEZONE
5,507,000
Matthew Parnum

ACTION



WHEN THE KANGAROO GOES APE!

KID KANGAROO

Those pesky monkeys are going to "roo" the day they tangled with my Mom.

Let me introduce myself cobber, I'm Kid Kangaroo and I'm as trussed up as a platypus in a net and blindfolded too — wouldn't you just know it possums.

Even now I'm being held in a treehouse by this gang of apes. I can hear Mom coming to the rescue, but it sure ain't going to be easy for her.

The monkeys are hurling down apples, which she has to dodge. But if it comes to a fist fight, I'd back my Mom against 'em anyday she usually gets the first punch in.

First off she's got to climb a load of rope ladders hung between the branches of the tree. And if she manages that, she must test her special leaping ability by jumping to the top on log steps at different heights.

She's got to be careful though, one false leap will send her tumbling to the jungle floor.

The third stage of her rescue attempt is against a column of monkey kidnappers standing on each other's shoulders, holding the cage (with me in it) at the top. Mom is going to punch them out one-by-one and leap onto higher platforms alongside the cage to attempt her rescue. But her heroics aren't over yet, for Mom has one more challenge . . . she must climb a series of long and short ladders to reach me.

But the real bludger of it all is, that even when she does rescue me and I shout "Mom" at her and somewhere someone plays "Oh Susannah", the monkeys just kidnap me all over again,

And if you thought it all sounded similar to Donkey Kong, well there's a gorilla in our game too. He enters the scene if Mom should hesitate along the way, and tries to nick her boxing gloves.

IT'S A-MAZE-ING!

Well it had to happen didn't it! A pinball based on that loveable denizen of the arcades Pac-Man.

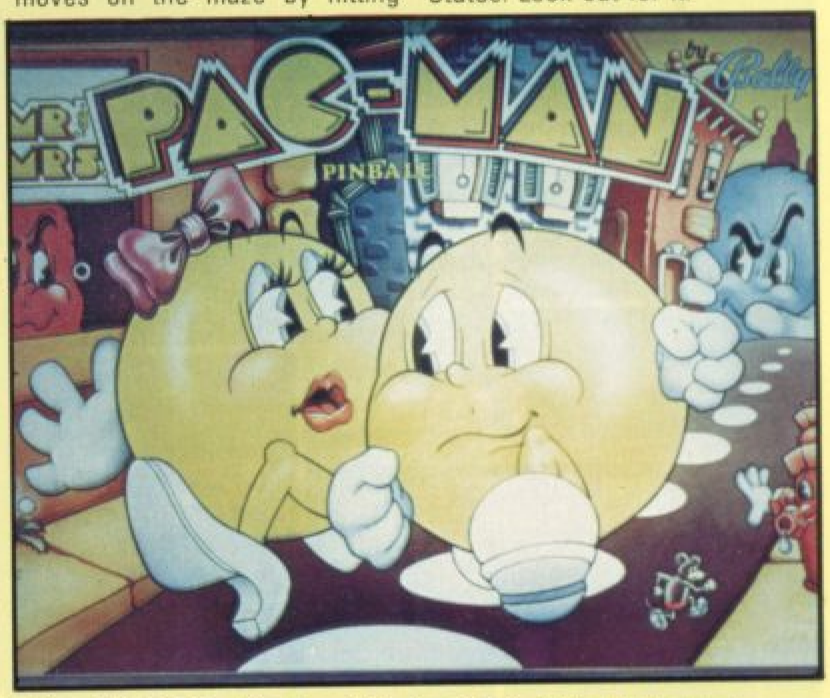
This one comes from Bally and includes features which should keep every pinball wizard happy. Mr and Mrs Pac-Man is an awkward name for a good table — but don't be put off.

It's biggest departure from pinball design is the inclusion of a Pac-Man "maze" feature in the middle of the playfield. This is a five by five square of lights which represents the maze. Once activated the player has to avoid the red "ghost" light and guide his yellow "Pac-Man" light around the maze with the objective of illuminating all 25 lights. Just like the video version you get three lives to play with.

The player wins Pac-Man moves on the maze by hitting targets on the pinball playfield. You activate the maze by slotting your ball into one of two Pac-Man "saucers" on the playfield. Controlling your Pac-Man in the maze is fairly simple once you have mastered the technique. You use the left hand flipper button to indicate direction and the right-hand to move.

By hitting the top drop target bank three times you can turn your normally passive "Pac-Man" into an aggressive little monster who pays no heed to the "ghost". If you've clocked up enough moves while playing regular pinball you will then easily be able to complete a maze.

This colourful addition to the ranks of Bally's tables is sure to prove a winner. Already it's the third top selling table in the States. Look out for it.





AMAZING ANTICS IN AERO-MAZE

LOOPING

Balloons drifting peacefully in the breeze are the villains of the new U.S. chart-topping game, Looping.

The balloons have a tendency to drift into the flightpath of a small aerobatic plane which is controlled by the player.

And it wouldn't be so bad if there wasn't so many of them drifting around the screen.

The temptation is to push the fire button and blast those multicoloured canopies to shreds and the machine does encourage you to take this course of action — purely in the interests of survival.

While negotiating your way through the balloons over a city, you should watch out for a terminal which has to be blasted away by gunfire to reach the next stage of the game.

This leads through a tunnel to a maze which represents the next challenge.

This is really precision flying and shows how the game got its name, as often, the only way to progress is to indulge in some fancy aerobatics.

Looping and turning through the narrow passages to find your way to the outlet of the maze. The passages resemble a plumber's nightmare of twisting pipes and the area left for manoeuvre often reaches critical proportions.

And the plumbing makes sense when you reach another box with a large tap dripping death down on top of you.

If you survive the tap sequence you can find your path cleared back to tangle with the balloons — only this time the gateway to the tunnel is open and ready to take you through a more difficult maze.

RSONAL CO

LONELY Genie I Microcomputer, early eighties, with large peripheral family but currently unattached, would like to meet interesting, attractively packaged software, Genie or Tandy specification, for programming, problem solving, entertainment and long-lasting friendship. Reply in confidence. Box No RS232.

ANSWERING MACHINES



ingenious ...but lonely!

Buying your first Genie I microcomputer is just the start of a long and enthralling adventure, for it won't be long before you will want to expand your system with some of the wide range of peripherals which make up the complete Genie System.



Firstly there is the

Expansion Box,

which immediately expands your Genie's capacity to 32K RAM, and up to 48K RAM if required. It can be connected to 4 disk drives, a printer, RS232 interface or S100 cards.

Then there is the

Printer,

a compact unit with 80 column, 5 x 7 matrix print-out, which connects to your Genie through the Expander, or via the Parallel Printer Interface.





The

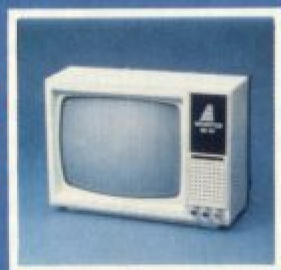
Disk Drive

gives you greater storage capacity and full random access file handling, with the option of double-density through a special adapter.
New Dual Disk Drive now available!

Finally, there is Genie's very own

12" Monitor,

a must if you want to let the rest of the family watch their T.V. in peace!
Available in B & W or green tube.



The supreme advantage of the Genie I system is its compatibility with the TRS 80, which means that literally 1000's of pre-recorded programs are already available, just waiting to be plugged into your Genie!

The recent improvements in the Genie system, including Extended Basic, sound unit and machine language monitor, make it the ideal system for the committed hobbyist, and an excellent and easy-to-use educational tool.

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for all your technical advice and service back-up on any aspect of the Genie system direct from the experts!

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Graphics



BUYING THE RIGHT MICRO

If graphics is one of your main computing interests, and if you are thinking of buying a micro, then deciding which machine to get can be a rather difficult and complicated matter. The expense involved means that, even if you can persuade someone else to buy it for you, it is important to make the right decision. There are so many microcomputers available now that it is almost essential to know what you want to use yours for, because only if you have definite requirements can you obtain the machine which fulfils them.

Many people want to play games, but to have the benefit of the best graphic displays. Others want to program graphics themselves: the intended uses typically include illustrating and enlivening the user's own games programs, presenting information and exploring computer art. I would say that for anyone with a serious interest in graphics, the ideal choice lies between comparatively few machines. Of course, the cost is a factor, but even when spending £200 or less there is a degree of choice.

The first decision is to pick the style of graphics that you are satisfied with. The choice is between pixel graphics, block graphics and high-resolution line drawing graphics.

Pixel graphics, as provided for example by the Tandy TRS-80, Video Genie and ZX81 are the crudest form of graphics available, although they can be quite effective. However, the resolution that can be obtained is usually rather limited (128 x 58 on the TRS-80), and for this reason lines and curves usually have a visibly "stepped" appearance while shapes have to be represented by rectangular approximations.

With block graphics, which are possessed by the Pet, VIC and Texas TI99/4A, images are composed using character-sized graphics symbols. Quite remarkable images can be designed given sufficient ingenuity.

With the Pet and VIC a fixed repertoire of graphics symbols must be used, but the Texas machine allows the user to design his own graphics characters: for a particular game or application a carefully thought out set of user-defined graphics can make the resultant programming very much simpler.

Systems using block graphics can give what we might call pseudo-high-resolution graphics because by combining graphics characters perfect lines can be drawn, but only in certain directions, and perfect curves can be drawn, but not in the variety that is available with a genuine high-resolution system.

This naturally leads us to consider high-resolution graphics, which has to be the ultimate tool for anyone geunuinely interested in graphics. Most machines with high-resolution graphics provide a resolution of at least 256 × 192 and, in their Basics, drawing commands such as MOVE, for moving the drawing position, and DRAW, for drawing a line.

The highest resolutions available on various machines include 640 × 256 with BBC Model B, 320 × 192 with the Atari 400, 256 × 172 with the Sinclair Spectrum and 176 × 158 on the VIC when a high-resolution graphics cartridge is added to the basic machine.

After deciding on the type of graphics, the decision as to whether you want colour or not needs to be made, but since all well-designed games using colour leave their monochrome competitors way behind, this decision should not take too long.

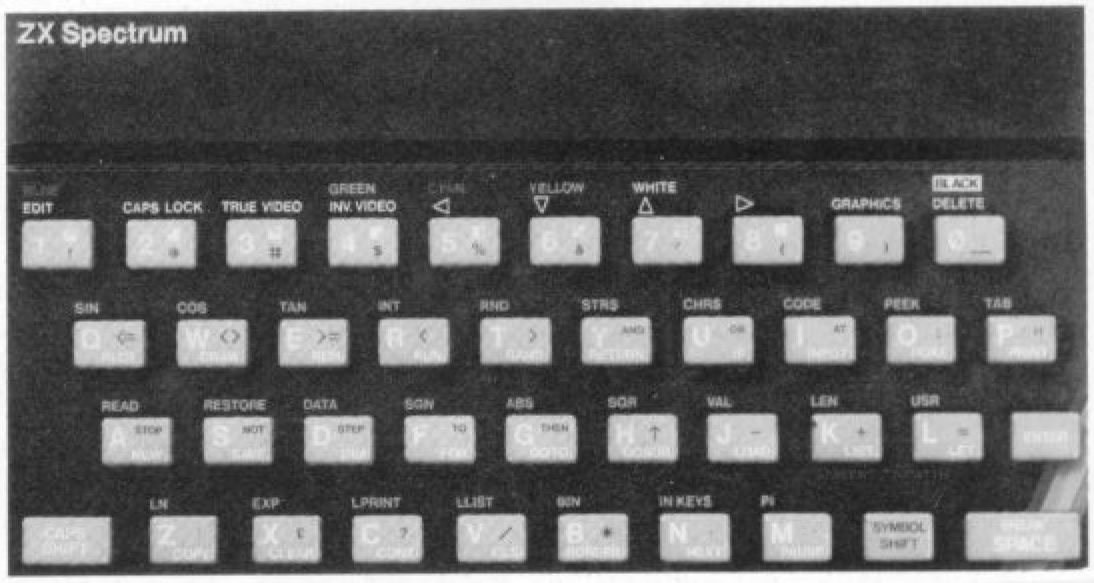
The BBC micro, Atari, Spectrum and VIC are all colour machines, although the number of colours that can be used at their highest resolutions tends to be limited because of the amount of memory that is used. A consideration when producing realistic displays is whether colours can be displayed in various intensities because this allows, for instance, shapes to be modelled in the same way as a painter can model an object in pure colours without using sketching. The Atari provides 16 levels of intensity for each colour and the Spectrum gives 2.

For those more interested in playing games the amount of software available, and its quality, is an important factor. There is a good deal available for the Atari, quite a lot for the VIC and, at present, relatively little for the BBC Micro and the Spectrum, pictured below.

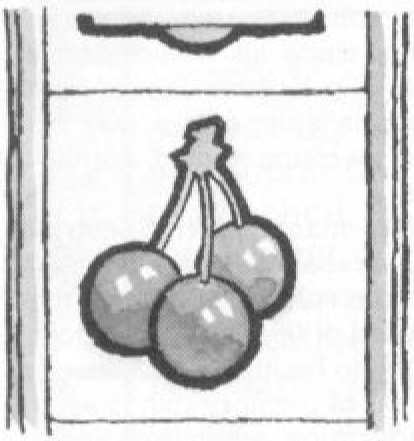
An article discussing the choice of a micro for graphics probably ought to end with a firm recommendation of some sort, and it does seem to me that the Spectrum is a very interesting prospect.

The BBC micro needs no endorsement from me. The VIC is a fine, proven machine, although its future seems a little clouded.

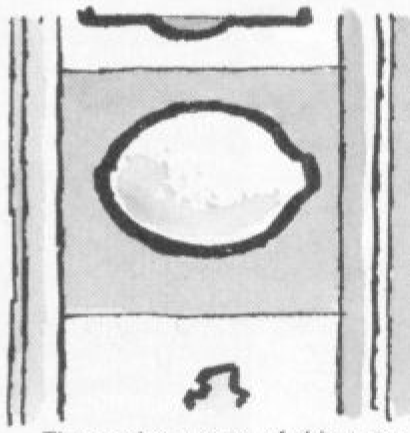
My choice at this stage would be the Atari. The Atari 400 is good value at its new price. The Atari 800 is a much more professional machine but, in my view rather over priced.

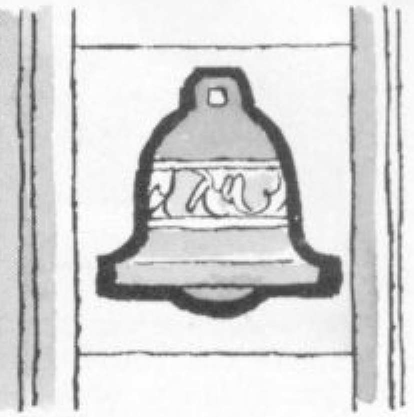


BY GARRY MARSHALL



NOT QUITE SIX OF THE BEST FOR VIC





REVAMPED REVIEWS

We have a new broom sweeping through the columns of our Review pages in response to many reader requests for a marking system on which to judge the games we review.

We have come up with three areas which we hope will cover every aspect of games software.

Our review team can expect to have their noses kept to the grindstone for the next few months, marking up tapes in accordance with our new points system.

Each game will receive ratings in three categories. These are defined as "Getting Started": problems loading the tape and a measure of how much help a cassette or disk gives, in making the game easily accessible to the buyer.

"Value" looks at the value-for-money question and takes into account whether the game utilises all the facilities of the machine, presentation and packaging.

"Playability" refers to the enjoyment the game offers, whether it would hold the reviewers' interest or whether it is a good example of the type of game it is based on.

Each mark is made out of a possible 10 and we hope it will provide an accurate guide.

We will also be looking at a particular game for a particular machine from time-to-time, say Pacman for the VIC-20. We will give a thorough rundown of every possible version and compare these for a best buy.

Our hope is that the Reviews section of the magazine will be of more use to purchasers.

VIC 6

Quantity rather than quality seems to be the order of the day at Beelines manufacturers of the Vic 6 series of games. Their latest offering features Fruit Machine, Brickdown, Blockade, Roulette, Hangman, and Tarkus — only three of which — Roulette, Hangman and Blockade — worked properly.

Fruit Machine was the biggest disappointment for me — a keen bar room 10 pence pusher — as the game loaded successfully, appeared on the screen, but would then not obey the instruction to start. This became a familiar pattern as I progressed to Brickdown and then Tarkus.

Brickdown did actually start — it is a breakout type game — though the bat could not be made to move up and down, the offending keys being the same as with Fruit Machine "F" 5 and 7.

Blockade did run — not that it mattered — as it is a graphically poor and deathly slow version of Space Invaders.

Beelines explain the problem with key F7 as being due to a bug built into the operating system of the VIC-20. They also point out that the Fruit Machine game is not written for the unexpanded VIC requiring a 3K cartridge.

The saving grace of this tape were two excellent games on side B — Roulette and Hangman. Hangman I particularly enjoyed — the graphics are good the little man appearing arm-by-arm and leg-by-leg, so much better than the stick men of the pen and paper version that we all used to play at school.

The game also gives you a running list at the top of the screen of the letters you have already tried. If you are hung the game commiserates and asks you if you would like to try again. This is a simple yet absorbing game and would be an ideal way for children to improve their spelling and learn to use the VIC-20.

Roulette brings the excitement of the casino to your living room. The game gives you £5,000 to start, you choose your lucky number and then press space to start.

Unfortunately the game does not display a wheel but a digital number display.

This does not detract too much from the game though as the numbers do start off fast and then slow down, sometimes causing you to celebrate too early when you think your number is up with your last £100 on the table, just as in a real game of Roulette.

Two good games did not really compensate for the frustration of four games that would not start, or would not work properly if they did.

VIC 6 is available from Bolton-based Beelines at £9.95 including postage and packing.

- **Getting started 2.**
- **Value 2.**
- **Playability 7.**

WHO NEEDS GRAPHICS!

SCRAMBLE

This version of Scramble proves that you don't need sophisticated graphics to produce an enjoyable arcade game replica.

The missiles here are capital "A"s fired up in a looping flight from the hillsides and valleys. The alien planes are made up of "less than" signs arrowing their way through the skies and the fuel tanks are grey smudges dotted along the landscape.



But for sheer compulsion it is going to be hard to beat this game. You play the part of a aircraft armed with bombs and guns, on a mission over enemy territory.

The screen scrolls from left to right, forcing you forwards but allowing you to alter altitude above the crags and chasms of the landscape.

Fuel tanks and missiles can be blown up to score points, either by dropping to their level and firing out ahead of you, or by sending looping bombs over the hills to drop down on them.

The missiles periodically take-off and it is advisable to try and

Illustrations: Jon Davis

destroy them before you have to pass over them or retreat to the top of the screen where they are less likely to surprise you.

But the greatest danger is posed by the enemy airborne fleet which descends from the heavens in groups of up to four, spitting fire and rising and falling in flight as they search for you.

The tactics are pretty obvious but the race to beat a friend's high score is thrilling. It has all the addictive ingredients of being a game simple enough to make you believe you can always do better, so you never finish satisfied with your performance.

Quicksilva have already won themselves a good reputation for producing good arcade replicas within the limitations of the ZX81, this cassette will further that reputation.

It costs £4.95 from Southampton-based QS and runs on a ZX81 with 16K Rampack.

- **Getting started 9.**
- **Value 8.**
- **Playability 8.**

FIGHTING THE GOOD FIGHT ON THE ZX81

CONFLICT

War — its cost in hard cash as well as in the cost of ships, planes, tanks and the incalculable cost of the lives lost — are the principle ingredients of Conflict — a new computer-cum-board game.

The aim of the game is to fight off your opponent and conquer his territory.

Each player is given a sum of money which he can use to drill for oil or speculate on the stock exchange in order to finance his war effort.

There are also a number of neutral merchant vessels whose cargoes of gold, silver, copper and iron can be captured and added to your fighting fund.

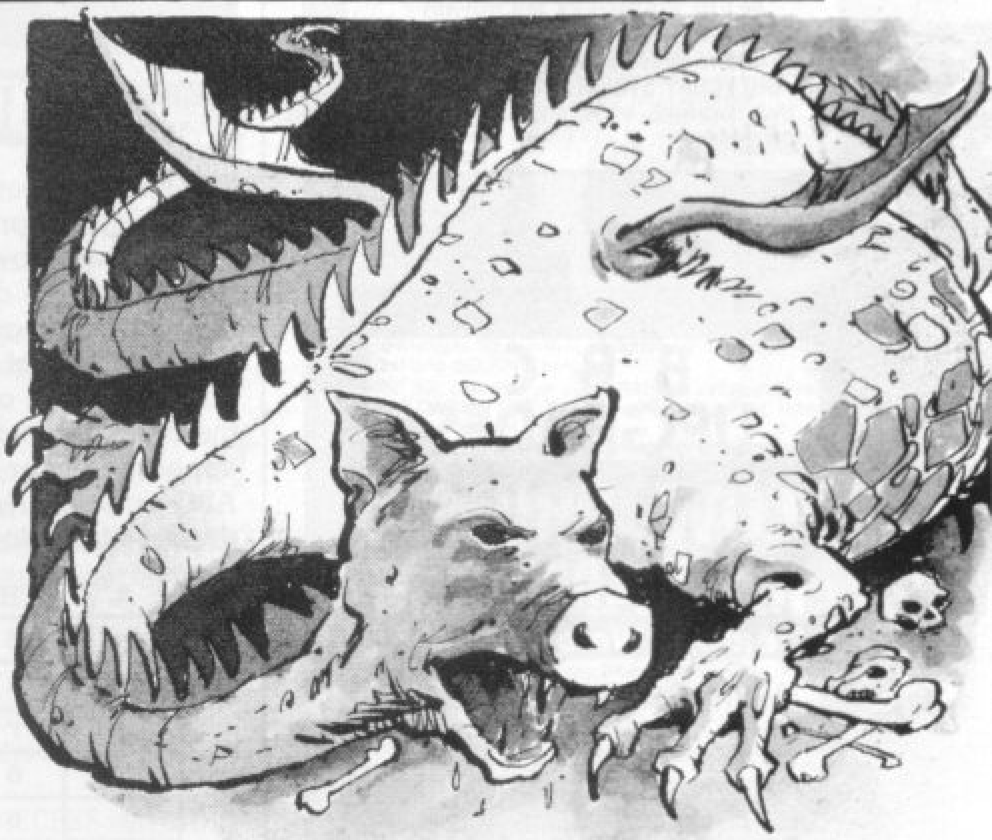
Once the armed forces of both sides have been assembled the battle can commence. It is a protracted war of attrition in which you must keep a keen eye on your opponent's positions and the relative balance of ammunition and supplies

The computer keeps tally of your cash, stocks, shares and missiles but it does not provide a display of the board.

I enjoy this strategy game as it made me think, rather than letting the computer do all the work, as so many other new computer games do.

Conflict is available from Martech Games at £9.50 — which includes the cassette, board, counters, markers and 40 disposable maps. The game runs on a ZX81 in 16K with versions for the Video-Genie and Pet in the pipeline.

- **Getting started 9.**
- **Value 7.**
- **Playability 7.**



BEWARE THE BOUNCING DRAGON!

BORG

You are trapped in a castle full of dragons, on a mission to seek out and destroy the evil Grud.

Grud is a tyrant who rules the Grudonian countryside with an iron fist. He is a cunning adversary — marshalling his army of dragons from well behind the battle lines, staying out of the fray until the very end when only the cleverest of opponents will have survived 10 rooms full of hazards to do battle in Grudgeon — Grud's Lair.

Grud's chief ally is Borg who he will call up to the battle when the dragons seem to be losing the fight.

You can hear Grud calling Borg although you cannot see him. This is a most amusing aspect of the game — tone Grud calls Borg as if he were calling his pet poodle.

Unfortunately Borg is no pet poodle — but a fierce dragon — larger than the other dragons and more deadly.

Borg bounces across the screen killing anything he comes into contact with. As you cannot shoot Borg — his appearance is the signal to make a dash for the next room.

The 10 rooms you must negotiate will test your senses to the full. The Rohrschach Room is a test of your powers of observation, Huevos Grande is the kitchen — guess who is on the menu — the Bear Trap Room will trap you as well as any bears who happen to be in the vicinity. There is also the Trash Compactor Room — which I did not get to, but which is engagingly described in the instructions as being named in honour of Grud's favourite author — Grudgar Allan Poe.

I found Borg an enjoyable, even compulsive, game though I was not sure — even as I pressed the space bar for what must have been a 100th time, whether I was doing so out of real enjoyment, or out of sheer frustration at being unable to get further than the second room.

You cannot imagine the frustration of hearing Grud shouting for Borg — but then not being able to see him!

It is very difficult to manoeuvre your little man as most of the time he will only move forward in diagonals — but then suddenly, and for no apparent reason, he will move forward or backwards horizontally.

Borg is not really a keyboard game and I think it would have been better if the instructions had recommended a joystick more definitely.

You will also require a colour screen to become really adept at Borg as many of the hazards can only be identified by colour.

Borg is a good game based on the Berserk principle. It is produced by Sirius Software and runs on disk for the Apple II, available from London based Software House at £19.55.

- **Getting started 7.**
- **Value 5.**
- **Playability 8.**



Brainware

MIND ROUTINES

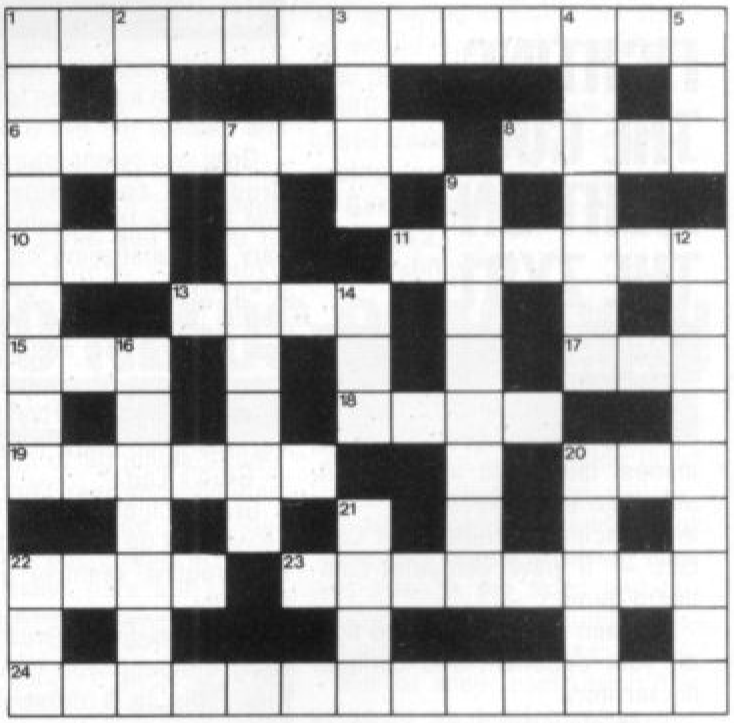
The standard set of 28 dominoes are set out to form a 7×8 grid of numbers as shown. Can you reconstruct the dominoes (i.e. link the numbers together in pairs) so that each one of the 28 appears once and once only. For example the double one domino can appear in either of two places — ABO or DMN. Note that the double-blank domino could appear in any of 10 positions.

Winners of our July issue Brainware problems were: P. M. Hynes, 75 Thorpes Avenue, Denby Dale, Nr. Huddersfield, Yorkshire and Mr Alan Northcott, 'Rushmoor', 464 Reading Road, Winnersh, Wokingham, Berkshire RG11 5ET. Bottles of champagne are on their way to both.

Two more bottles can be won for the first people out of the hat with this month's answers correct. Answers to the August problems are on page 12.

A	B	C	D	E	F	G	H	
6	5	3	3	1	2	4	2	I
6	5	5	3	4	6	5	1	J
3	1	0	0	0	0	2	3	K
3	6	0	0	0	0	4	3	L
1	6	5	1	3	2	2	2	M
6	6	4	1	5	2	5	2	N
1	1	4	2	6	4	5	4	O

NEVERA CROSSWORD



ACROSS

1. Great M.Sc Event Circulated for Intellivision, Atari etc. (2, 5, 6)
6. Satellite's at a high temperature for video game (8)
8. Computer and Video Game's publisher. Some of us saw them appear! (4)
10. Collection verb assigning value to COBOL index (3)
11. Part of 10 — an underwater collection? (6)
13. Shilling tin search (4)
15. Ancient Basic command (3)
17. Pass on a random number generator (3)
18. On which the Spectrum's output is displayed underground (4)
19. New game groove grooved! (3, 3)
20. RAIR terminator on the radio (3)
22. Nothing in the ROM kitchen for example (4)
23. Video game sacked the Mona Lisa (8)
24. If I can't cope is confused instructions for a programmer (13)

DOWN

1. Adventure game - or a collection of bits from a leading newspaper (9)
2. Force party giver prominent in Haunted House game (5)
3. In which assorted lots of coins are placed in the arcade game (4)
4. Paper boss — or it's educational counterpart (5, 2)
5. Abbreviated computing from timed prints (3)
7. Rainbow machine (8)
9. Blue safe turnabout wherein to recharge your rockets (4, 4)
12. Micro or part of an ATOM (3, 6)
14. Duck in No Trump negation (3)
16. Alsation left as losing Gunfight player might utter (7)
20. A king I found on a junction supplies micros and video games (5)
21. Computer skirt (4)
22. Small resolution found in space rocket (3)

SOFTWARE GLOSSARY

A beginner's guide to plain jargon

ACTION GAME: A game to test the speed of your reflexes — Space Invaders for example.

ALGORITHM: A process or set of rules to carry out a task or solve a mathematical problem.

ARRAY: A series of items arranged to form a meaningful pattern.

BASIC: The most widespread computer language which is one of the easiest to learn and is used for programming all microcomputers.

BUG: A slang term given to a mistake in a computer program which prevents it from working. It can refer to a mechanical, electrical, or electronic fault.

BUS: The circuit over which data or power is transmitted.

BYTE: A term to measure a number of Bits (BInary digiTS), usually there are eight bits to a byte.

COLOR: American spelling used to call colour out of several U.S. computers, e.g. the Apple.

CURSOR: A position indicator used by most computers to show where the next character should be entered.

DROP TARGETS: Targets on a pintable which retract upon being hit by the ball.

GET: A Basic command which tells the computer to scan the keyboard and return with either a numeric or string value.

GRAPHICS MODE: A mode in which the computer can produce graphical characters and displays.

HARDWARE: The general term given to all pieces of electronic and mechanical devices which make up a computer system, i.e. the actual machines.

INKEY$: A Basic command which checks the keyboard for input and places it in a string.

INPUT: Data or information which is fed into the computer.

INTEGER: A number which does not contain a decimal point, i.e. a whole number.

K: See kilobyte.

KILOBYTE: A measurement of memory capacity. 1K is equal to 1024 so 8K is equivalent to 8192 bytes.

L.E.D.: (Light Emitting Diode) Provides a simple display and consists of an electron tube which lights up when electricity is passed through it.

LOAD: Instruction which is used in conjunction with a cassette recorder to transfer programs from tape to the computer's memory.

MATRIX: A rectangular array of numbers subject to mathematical operations.

PERIPHERALS: Equipment which is used with a computer system, e.g. printers, disc drives, and VDUs.

PRIORITY INTERRUPT CONTROLLER: Facilitates high-speed Interrupt processing.

PROGRAMMABLE TIMER CONTROLLER: A chip which counts time independently of the microprocessor.

PLOT: To map or draw points on the screen.

RAM: (RANDOM ACCESS MEMORY) This is a memory chip which you can load programs and data to and from.

RAMPACK: A cigarette-case sized pack of extra R.A.M. which plugs onto the back of a Sinclair ZX81.

RUN: Basic command word tells the computer to perform the numbered sequence of actions referred to as a program.

SOFTWARE: Another name for computer programs.

STARTREK: A popular computer game based on the TV series of the same name, in which the player takes command of the Starship Enterprise and roams the galaxy, destroying Klingons and investigating solar systems.

STATEMENT: An instruction in a computer program.

STRATEGY GAME: A game in which you must carefully plan your moves taking into consideration the likely counter moves of your opponent.

STRING: Usually represented by a $ sign on the computer keyboard, a string is a connected sequence of characters or words, usually placed within PRINT statements.

SYNTACTIC ERRORS: Typographical mistakes in program lines. Information put in the wrong order, information which conflicts with other information or program lines which refer to other unentered lines.

UART — UNIVERSAL ASYCHRONOUS RECEIVER-TRANSMITTER: Device for interfacing word parallel controllers or data terminals to bit serial communications networks.



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A GAMES PLAYER'S GUIDE TO THE SHARP MZ-80K

THE ALL-IN MICRO

The MZ-80K was launched in this country in 1979 — the first Japanese microcomputer to be sold in the U.K.

The basic package is an "all-in-one" unit, with a screen, tape deck, and computer console built into one unit. So you do not have a spaghetti junction of leads worming their way around the living room. The MZ-80K has just one lead which plugs into a normal mains supply.

The MZ-80K comes with a comprehensive instruction manual which teaches you Basic through a series of examples and exercises.

Sharp Basic has to be loaded into the machine from cassette tape which is supplied with machine. Loading Basic requires 16K of memory, leaving only 4K of memory for user programs if you purchase the standard 20K version. However, most of the MZ-80K's sold were the 48K version of the machine which have 32K of memory for user programs after Basic has been loaded.

The tape deck comes complete with a tape counter which is useful for locating programs, and is reasonably fast capable of 1200 B.P.S.

The black and white screen is 10" wide and has 25 lines of 40 characters per line.

The MZ-80K also has a built-in loudspeaker to make use of the music and sound facilities which enhance the wide range of games software that are available.

Sharp UK sold out of the MZ-80K in April as consignments of its new re-vamped machine the MZ-80A began to fill its warehouses. The K is still available from most Sharp dealers although the price varies a lot, having fallen sharply since the MZ-80A has been announced.

EASY TO EXPAND

The MZ-80K has a wide range of equipment available which enables you to expand the computer as your knowledge and requirements grow.

The MZ-80 I/O, interface unit connects the central processor unit, the Z80 within the MZ-80K, to other peripherals such as dual standard 5¼" floppy disks. The MZ-80 gives a real memory expansion — but you'll need to have the odd £600 handy at current prices.

There are two printers available for the MZ-80K. The MZ-OP3 is a tractor feed printer — which stops the paper from slipping, and can print all of the computer's 226 characters at a speed of 96 characters-per-second. The MZ-80P3 is currently selling at £395.

The Epsom MX-80F/T is also a tractor feed printer but unlike the MZ-80P3 it is capable of printing high resolution graphics. Sharp graphics chips convert the Epsom MX-80 printer to give full Sharp graphics and a wide range of other features. The package is complete with its own Basic tape to give the extra commands required to utilise the wide range of extra functions.

High Resolution Graphics operate in ESC K and ESC L modes — ESC K producing 480 dots per line, and ESC L giving 960 dots per line. The Epsom is available from Sharp dealers at £350.

The Quantum Hi-Res Graphics System works off two static RAM chips and includes four self-executing programs — all of which run in Sharp Basic.

These include a graphics editor to facilitate the simple programming of special characters: HEX, PLOT, and JOIN enable you to create your own graphics. It also has a demonstration on high resolution plotting, and an extension of plot routines. Quantum Hi-Res Graphics System is available from most dealers at £115.

BASIC SHARP

Sharp Basic is supplied with the machine on a cassette. You load it into the machine, leave for about a minute and a half and the machine will then tell you that it is ready for user programs. Sharp Basic is very similar to Microsoft — the standard language of most microcomputers.

For the more adventurous programmer there is an advanced language called Forth which enables the user to impliment his own ideas, within the structure of the language. A new version of Forth has just been introduced by Kuma Computers at £34.95 including a 32 page instruction manual. Sharpsoft and Knights TV and Computers also sell a Forth package.

There are two educational languages available for the Sharp MZ-80K Cesil 3 and Pilot both of which are available from Sharp dealers.

There are also a number of business languages available for the MZ-80K but these will require a hardware modification to take CP/M software.

THE GAMES PEOPLE PLAY

Games playing on the MZ-80K has been improved by the development of a joystick by Microspec of Kilsyth. It costs £34.00 and includes an instruction cassette and three free games. The joystick plugs straight into the back of the MZ-80K and does not require I.O. Board. It runs on 6-9 volts requiring a power supply unit which is also available from Microspec at £4.50.

HARDCORE

A GAMES PLAYER'S GUIDE TO THE SHARP MZ-80K

SLEEK MACHINE

Sharp's new machine — the MZ-80A is a 48K "all-in-one" computer on the same sleek lines as the MZ-80K.

It is housed in a rigid plastic mounting — unlike the K, which is housed in a metal cabinet.

The new machine has been given an improved keyboard which facilitates touch typing — something it is not easy to do on the MZ-80K, and has a slightly larger screen — with a green character display.

Sharp Basic for the A is supplied on cassette with the machine and is almost indentical to Basic for the K, which in turn is very close to Microsoft. This similarity in Basic is a definite plus to the potential MZ-80A buyer as it means that all the software that is now available for the K can be very quickly converted by the software houses to suit the A.

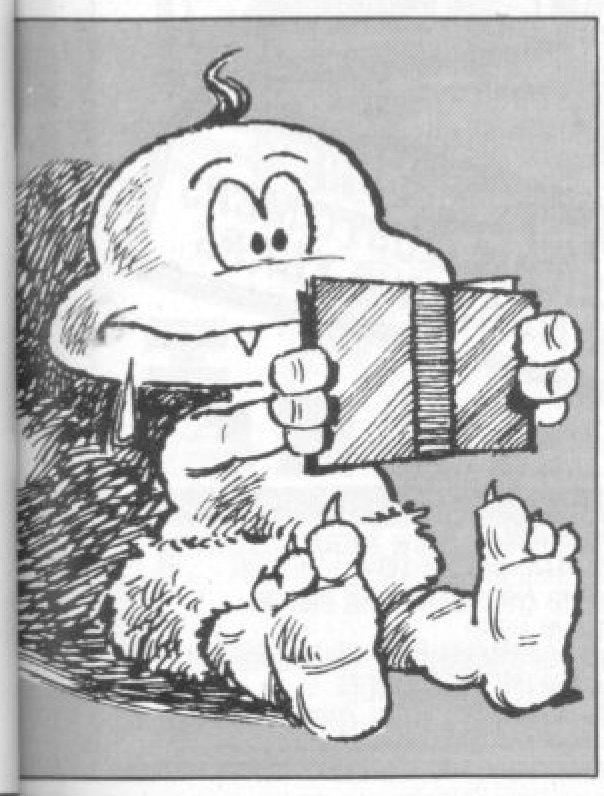
The MZ-80 is considerably more expensive than the K — in the shops at a price of £549 (inc VAT). The price difference is thought by Sharp dealers to take the machine out of the home hobbyists market into the lower end of the business market.

Expansion of the A is achieved similarly to the K. The basic Expansion unit costs £100. Disk drives (inc. Interface) are available at £400 for the single and £590 for the twin. As with the K there are two printers available for the A — Tractor feed at £349 and Friction/Tractor feed at £409. The interface costs £30, Cable £23, and character generator £13. All the above prices are exclusive of VAT.

THE BIG THREE

Sharp publish a regular MZ-80K Software Catalogue which includes a comprehensive list of all the games, business, and educational software that is available for the machine. The catalogue is available from Sharp Electronics (UK), Sharp House, Thorp Road, Newton Heath, Manchester M10 9BE.

The big three games software manufacturers for the MZ-80K are: Kuma Computers of 11 York Road, Maidenhead, Berks. SL6 1SQ; Sharpsoft 86-90 Paul Street, London EC2A 4NE; and Knights TV Computers, 108 Rosemount Place, Aberdeen.



Between them these companies can provide just about every type of computer game and a few more — from Pacman to Space Invaders there is a wide variety of games available for this machine. It has to be said, however, that the MZ-80K was designed with businessesather than games in mind. And you will need to purchase a joystick to enjoy games like Pacman, and Scramble to the full.

Other companies supplying games software for the MZ-80K are: Microspec, 143 Balmalloch Road, Kilsyth G65 9PH; Prorole Ltd, 642 London Road, Westcliff-on-Sea, Essex; Highlight Software, 3 Nether Court, Halstead, Essex; Premier Publications, 12 Kingscote Road, Addiscombe, Croydon.

WRITTEN WORDS

There is a growing library of published material available in English for the MZ-80K.

The *Beginner's Guide to the Sharp MZ-80K* by R. G. Meadows is published by Sharpsoft at £3.95 and can be obtained from their offices in London.

Peeking and Poking the MZ-80K by G. P. Ridley is available from most good bookshops at £4.30.

Software Secrets by G. Beech is also available from good bookshops and Sharp dealers at £5.95.

Software Techniques by Trowsdale is a new title on the MZ-80K available from most good bookshops and Sharp dealers at £5.95.

Sharpsoft also publish a series of User Notes for the MZ-80K covering a wide area of user interests. The notes are published three times a year and the 1982 subscription is £7.50 for the U.K.


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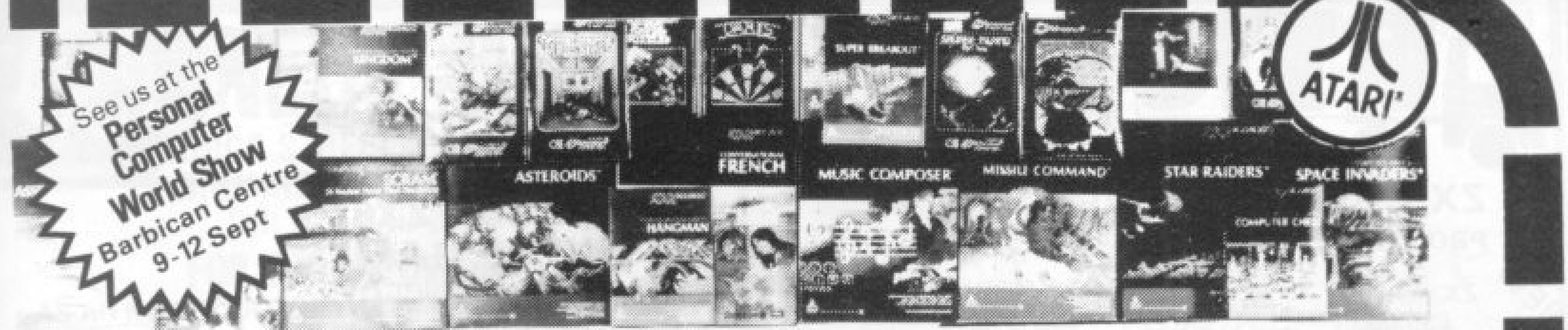
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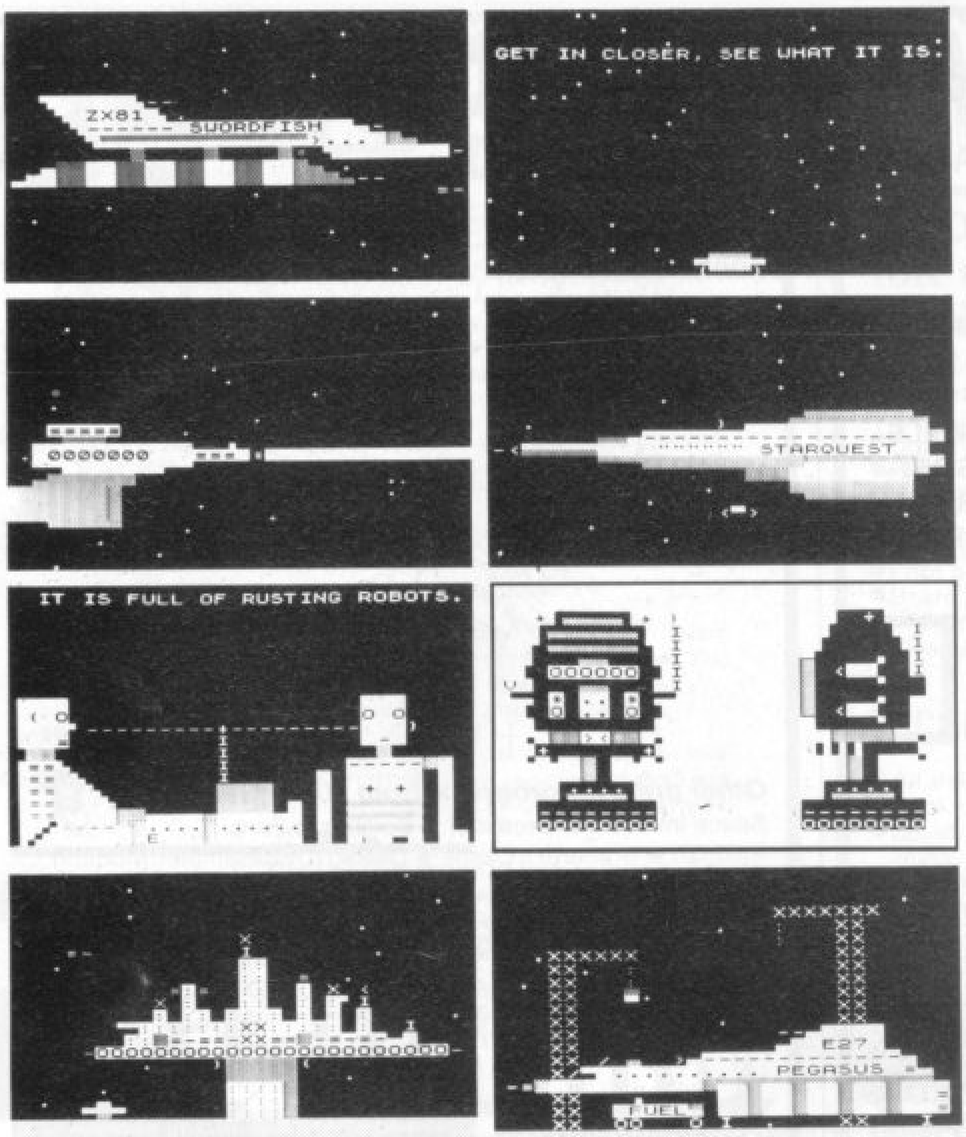
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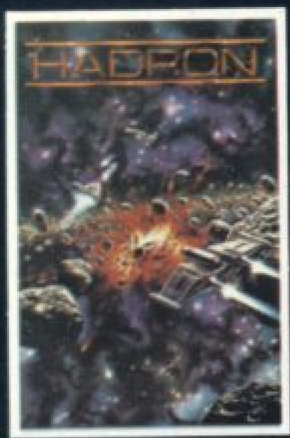
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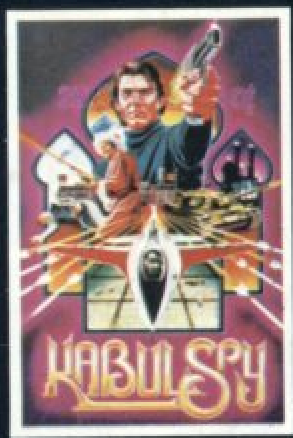
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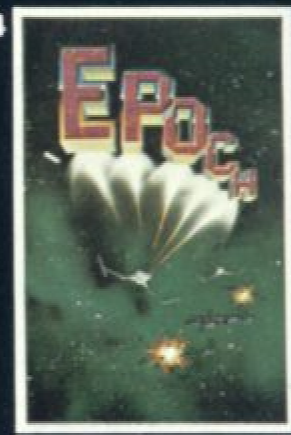
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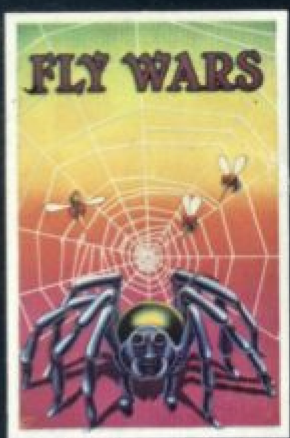
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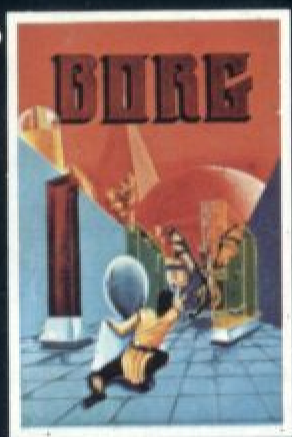
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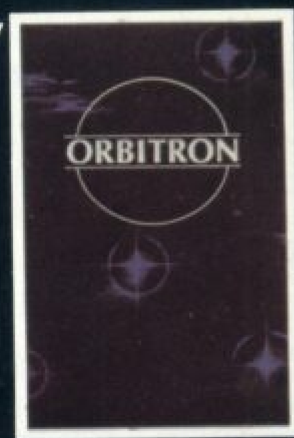
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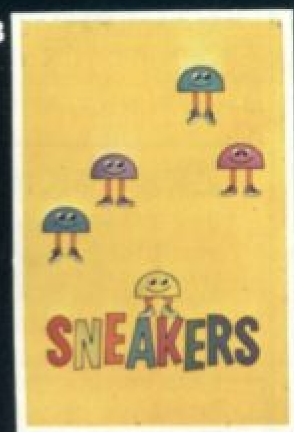
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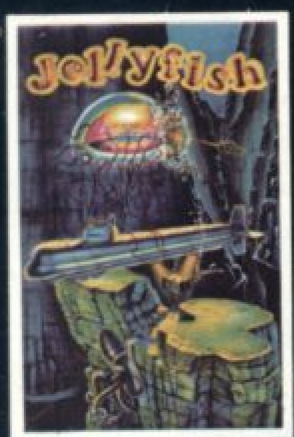
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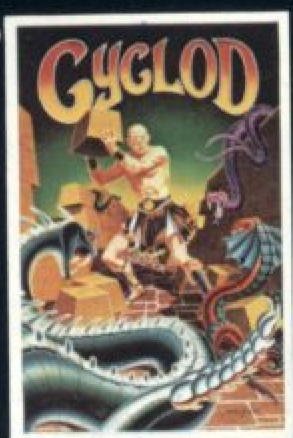
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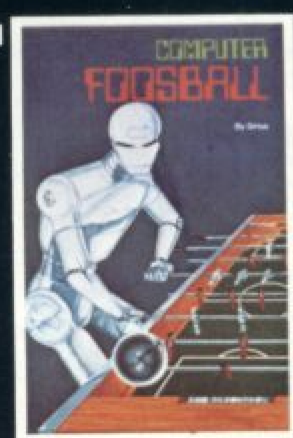
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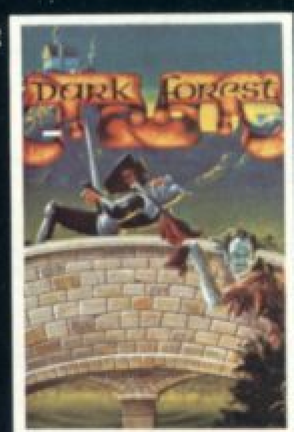
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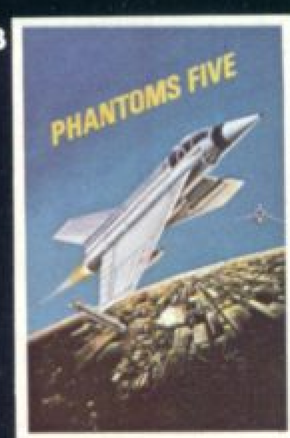
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